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VOLUME 9, NUMBER 21
NOVEMBER 1, 1976

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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 9, NUMBER 21
NOVEMBER 1, 1976

W76-11101 -- W76-11625

The Secretary of the U.S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
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03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
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05 WATER QUALITY MANAGEMENT AND PROTECTION
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06 WATER RESOURCES PLANNING
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07 RESOURCES DATA
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08 ENGINEERING WORKS
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09 MANPOWER, GRANTS, AND FACILITIES
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SUBJECT INDEX

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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1A. Properties

THE VOLUMETRIC PROPERTIES OF H20--A GRAPHICAL PORTRAYAL,
Geological Survey, Reston, Va.
J. R. Fisher.
Journal of Research of the U S Geological Survey, Vol 4, No 2, p 189-193, March-April 1976. 4 fig, 3 ref.

Descriptors: *Water properties, *Volumetric analysis, *Graphical analysis, Contours, Pressure, Density, Temperature.

A graphical display of the volumetric properties of water is presented as density (0.01 to 1.0 g/cm to the minus 3) contoured on pressure-temperature coordinates and pressure (1-10,000 bars) contoured on density-temperature coordinates over the temperature range 0-1,000 degrees C. Data were obtained from sources published during 1964-1969; several minor inconsistencies are observed and attributed to inadequacies in the equations of state used to describe experimental data obtained above 1,000 bars. (Woodard-USGS)
W76-11420

2. WATER CYCLE

2A. General

HYDROLOGIC ASPECTS OF FLOOD MANAGEMENT IN THE CHEMUNG RIVER BASIN,
Cornell Univ., Ithaca, N. Y. School of Civil and Environmental Engineering.
For primary bibliographic entry see Field 2E.
W76-11106

PROGRAMMABLE CALCULATORS: MODERN INSTRUMENTS FOR ANALYZING HYDROLOGIC DATA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7B.
W76-11416

DECISION THEORY AND ITS APPLICATION TO NETWORK DESIGN,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7A.
W76-11498

INFLUENCE OF SIMPLIFICATIONS IN WATERSHED GEOMETRY IN SIMULATION OF SURFACE RUNOFF,
Agricultural Research Service, Tucson, Ariz.
L. J. Lane, D. A. Woolhiser, and V. Yevjevich.
Hydrology Papers, Colorado State University, Fort Collins, No. 81, December 1975. 52 p, 47 fig, 11 tab, 54 ref.

Descriptors: *Mathematical models, *Model studies, *Surface runoff, *Watersheds(Basins), Channels, Rainfall-runoff relationships, Overland flow, Hydrograph analysis, Runoff.
Identifiers: *Kinematic cascade model, Kinematic impulse response.

The effects of simplification in formulating mathematical models for analyzing surface runoff are described. The purpose is to develop objective procedures for geometric simplification of complex watersheds modeled as kinematic cascades of planes and channels. A useful conception of a watershed surface is that it consists of the channel network and interchannel areas of overland flow within the watershed perimeter. Basic models are outlined for watershed geometry and rainfall excess-surface runoff; analysis is made of overland flow over uniform and complex slopes, with specific discussion of storage at equilibrium, kinematic impulse response and pulse response. Runoff from complex watersheds is described using goodness-of-fit statistics for simplified geometry, hydrograph fitting and analysis of hydraulic roughness parameters. Kinematic impulse response analysis emphasizes the influence of surface configuration on overland flow. .(Jahns-Arizona)
W76-11517

RIPARIAN DENDROCHRONOLOGY: A METHOD FOR DETERMINING FLOOD HISTORIES OF UNGAGED WATERSHEDS,
Arizona Univ., Tucson. Lab. of Tree-Ring Research.
For primary bibliographic entry see Field 4A.
W76-11523

2B. Precipitation

THE DETERMINATION OF REGIONAL EVAPOTRANSPIRATION BY MEANS OF STANDARD METEOROLOGICAL DATA,
Cornell Univ., Ithaca, N. Y. School of Civil and Environmental Engineering.
For primary bibliographic entry see Field 2D.
W76-11110

IFYGL WEATHER HIGHLIGHTS,
Atmospheric Environment Service, Toronto (Ontario). Lake and Marine Applications Section.
D. W. Phillips.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 296-320, 1974. 7 fig, 5 tab, 14 ref.

Descriptors: *Weather, *Weather data, *Lake Ontario, *Great Lakes, Climatology, Meteorology, Rainfall, Snowfall, Precipitation(Atmospheric), Networks, Temperature, Flooding, Solar radiation, Winds, Evaporation, Evapotranspiration, Runoff, Hurricanes, Storms, Lakes.
Identifiers: *International Field Year for the Great Lakes, Hurricane Agnes, Weather highlights.

One of the principal goals of International Field Year for the Great Lakes (IFYGL) Project 24 ME, Climatological Studies, is to assist principal investigators by comparing monthly averages of various meteorological variable during the data-gathering period with normals computed from the 1941-1970 period. Before data interpretation and model testing begin or before results are extrapolated elsewhere, conditions under which the scientific data were collected should be known. The weather during the data-gathering period of IFYGL could be described as cold, stormy, and dull. The mean annual temperature was within one degree of normal; however, five months had temperatures between one and three standard deviations. The period was also one of almost continuous, heavy precipitation and frequent flooding. Total precipitation from April 1972 to March 1973 varied from 800 mm north north of Toronto to 1600 mm in the Adirondacks, averaging about 175 mm greater than normal. Every month had an above normal number of days with precipitation, for an annual total of 45 rain days more than usual. The number of hours of sunshine was almost 200 hours fewer than normal (90%). The outstanding weather event of the field year was the torrential rain and widespread flooding caused by Hurricane Agnes. Rains totalling more than a foot fell in parts of the basin from the evening of the 20th of June until the morning of the 25th. For most of the Ontario side five day totals ranged from two to three inches. (See also W76-11275) (Sims - ISWS)
W76-11299

DURATION-LIMITED WAVE SPECTRA IN LAKE ONTARIO DURING THE 1972 HURRICANE AGNES,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2H.
W76-11309

SOURCES OF WATER QUALITY, LAKE LEVEL, ICE, WATER TEMPERATURE, AND METEOROLOGICAL DATA FOR THE ST. LAWRENCE GREAT LAKES,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
For primary bibliographic entry see Field 7C.
W76-11363

CLOUD ANALYSIS AND DIAGNOSIS OVER LAKE ONTARIO AND VICINITY,
Center for the Environment and Man, Inc. Hartford, Conn.
For primary bibliographic entry see Field 2H.
W76-11432

GREAT LAKES WIND FORECASTS BASED ON MODEL OUTPUT STATISTICS,
National Weather Service, Silver Spring, Md. Techniques Development Lab.
For primary bibliographic entry see Field 2H.
W76-11434

OBJECTIVE ANALYSIS OF IFYGL SURFACE METEOROLOGICAL DATA,
National Oceanic and Atmospheric Administration, Washington, D. C.
For primary bibliographic entry see Field 2H.
W76-11435

THE ATMOSPHERIC BUDGETS PROGRAM OF IFYGL,
National Oceanic and Atmospheric Administration, Washington, D. C. Environmental Data Service.
For primary bibliographic entry see Field 2H.
W76-11436

DETERMINATION OF THE AERODYNAMIC DRAG COEFFICIENT FROM WIND SET-UP,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2H.
W76-11437

TRANSIENT THERMAL RESPONSE OF LARGE LAKES TO ATMOSPHERIC DISTURBANCES,
Hydronautics Inc., Laurel Md.
For primary bibliographic entry see Field 2H.
W76-11439

2C. Snow, Ice, and Frost

TURBULENT KINETIC ENERGY BALANCE NEAR THE FROZEN SURFACE OF EASTERN LAKE ONTARIO,
York Univ., Downsview (Ontario). Dept. of Physics.
For primary bibliographic entry see Field 2H.
W76-11298

SELECTED SATELLITE DATA ON SNOW AND ICE IN THE GREAT LAKES BASIN 1972-73,
National Environmental Satellite Service, Washington, D. C.
D. R. Wiesnet, D. F. McGinnis, and D. G. Forsyth.

In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 334-347, 1974. 11 fig, 1 tab, 5 ref.

Descriptors: *Remote sensing, *Snow cover, *Ice cover, *Great Lakes, Satellite(Artificial), Snow, Ice, Mapping, Watersheds(Basins), Instrumentation, Infrared radiation, Lake ice, Temperature, Water temperature, Cloud cover, Water resources, Surveys.
Identifiers: *International Field Year for the Great Lakes, ERTS-1, NOAA-2.

Three snow-extent maps of the Lake Ontario drainage basin were prepared from NOAA-2 satellite visible band images during the IFYGL (1972-1973). These maps were discussed and the satellite data were evaluated for snow-extent mapping. The value of ERTS-1 imagery and digital data was also discussed in relation to the Lake Ontario basin studies. ERTS-1 MSS data are excellent for ice identification and analysis but are not useful for forecasting where timely receipt of data is imperative. NOAA-2 VHRR data are timely but the lower resolution of the VHRR makes identification of certain ice features difficult. NOAA-2 VHRR is well suited for snow-extent maps and thermal maps of large areas such as the 19,000 sq km Lake Ontario basin. (See also W76-11275) (Sims - ISWS)
W76-11301

SNOWMELT RUNOFF FROM PLANTED CONIFERS IN SOUTHWESTERN WISCONSIN,
Forest Service (USDA), St. Paul, Minn. North Central Forest Experiment Station.
For primary bibliographic entry see Field 4A.
W76-11369

FIELD STUDIES ON THE PHYTOTOXICITY OF CRUDE OIL TO SUBARCTIC AQUATIC VEGETATION,
For primary bibliographic entry see Field 5C.
W76-11405

THE TILTED FOREST: GLACIOLOGICAL-GEOLOGIC IMPLICATIONS OF VEGETATED NEOGLACIAL ICE AT LITUYA BAY, ALASKA,
Geological Survey, Tacoma, Wash.
A. Post, and G. Streveler.
Reprint from Quaternary Research, Vol 6, No 1, p 111-117, March 1976. 4 fig, 6 ref.

Descriptors: *Glaciers, *Alaska, *Vegetation effects, *Coniferous forests, *Glaciology, Time, Age, Dating, Time lag, Bays.
Identifiers: Lituya Bay(Ala).

Porter and Carson postulated that stagnant, forest-covered ice persisted as long as 2,000 years after the retreat of late Pleistocene glaciers in Puget Sound, Alaska, and cite as present examples several large, still active Alaskan glaciers which have forested margins. A better example was found in Lituya Bay, which was occupied by glacier ice until about 300-400 years ago. On the forested western side of the bay, tilted trees suggested buried ice; after considerable search, an exposure of clean, bubbly glacier ice was found under a mantle of forest duff and debris 1-2 m thick. The calculated melt rate suggests that some of this ice may persist for at least another 300 years. The 600+ years persistence of this stagnant ice supports the hypothesis that much larger forest-mantled deposits lingered as much as 2,000 years following the retreat of late Pleistocene glaciers. (Woodard-USGS)
W76-11423

2D. Evaporation and Transpiration

THE DETERMINATION OF REGIONAL EVAPOTRANSPIRATION BY MEANS OF STANDARD METEOROLOGICAL DATA,
Cornell Univ., Ithaca, N. Y. School of Civil and Environmental Engineering.
W. H. Brutsaert.
Available from the National Technical Information Service, Springfield, Va., 22161, as PB-256 213, $4.50 in paper copy, $3.00 in microfiche. Cornell University Water Resources and Marine Sciences Center, Completion Report, August 1976. 47 p, 6 fig., 7 tabs., 27 ref. OWRT B-052-NY(1). 14-34-0001-6101.

Descriptors: *Evapotranspiration, *Boundary layers, *Radiosoundes, *Water vapor, Atmospheric physics, Meteorological data, *Nebraska, Regional analysis, Watershed management.
Identifiers: Atmospheric boundary layers.

A recently proposed procedure to calculate actual regional evapotranspiration, using only regularly recorded upper air meteorological data, based on the parameterization of the turbulent atmospheric boundary layer was further investigated in an attempt to develop guidelines for its application in the solution of hydrological problems. In a first phase a comparison was continued between predicted evapotranspiration and measured watershed evapotranspiration in eastern Nebraska. It was found that contrary to the general assumption, the similarity function for water vapor in the atmospheric boundary layer is different from that for sensible heat. This prompted the second phase of the research which will consist of an exhaustive study of available meteorological data to obtain a more accurate determination of the water vapor and sensible heat transfer coefficients for the boundary layer. Preliminary results confirm the findings of the first phase.
W76-11110

COMPARISON OF METHODS FOR ESTIMATING POTENTIAL EVAPOTRANSPIRATION IN THE NORTH PLATTE BASIN OF WYOMING,
Wyoming Univ., Laramie. Dept. of Agricultural Engineering.
R. W. VanKlaveren, L. O. Pochop, and W. E. Hedstrom.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-256 236 $4.00 in paper copy, $3.00 in microfiche. Wyoming Water Resources Research Institute Laramie, Series No. 59, May 1976. 33 p, 27 fig, 8 ref. OWRT A-014-WYO(2), 14-31-0001-3851, 4051, 5051.

Descriptors: *Evapotranspiration, Model studies, *Wyoming, Evaporation pans, *Methodology, *Estimating.
Identifiers: Jensen-Haise method, Thornthwaite method, Blaney-Criddle method.

Three methods of estimating potential evapotranspiration, the Modified Jensen-Haise, Thornthwaite, and Blaney-Criddle methods, were evaluated and compared to adjusted pan evaporation. Average long-term daily estimates of evapotranspiration using the Modified Jensen-Haise method were generally higher while the values from the Thornthwaite and Blaney-Criddle methods were generally lower than adjusted pan evaporation. Estimates of evapotranspiration for stations where pan data were not available followed the same basic patterns. The Jensen-Haise method always gave the highest estimates and the Thornthwaite the lowest.
W76-11115

MONTHLY EVAPOTRANSPIRATION ESTIMATES FOR THE CANADIAN LAND PORTION OF THE LAKE ONTARIO BASIN DURING THE IFYGL,
Atmospheric Environment Service, Downsview (Ontario), Hydrometeorology and Environmental Impact Research Div.
H. L. Ferguson, and W. D. Hogg.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 269-287, 1974. 6 fig, 12 tab, 18 ref.

Descriptors: *Evapotranspiration, *Model studies, *Canada, *Lake Ontario, Evaporation, Mathematical models, Computer models, Rainfall, Solar radiation, Temperature, Winds, Humidity, Vegetation, Vegetation effects, Crops, Climatology, Meteorology.
Identifiers: *International Field Year for the Great Lakes.

A grid-square technique for calculating monthly evapotranspiration was developed in 1972 and tested in the Okanagan Basin of British Columbia. This method has been adapted to the Canadian land portion of the Lake Ontario Basin. The first step in the analysis is the tabulation of selected cover and physiographic characteristics for 136 grid areas of 400 sq km. Next, regression equations are obtained relating longer-term mean climatological data to cover and physiography. Grid area mean monthly values of precipitation, temperature and 'lake evaporation' (based on Class A pan network data) are then tabulated. Ratios of mean monthly evapotranspiration to mean lake evaporation, for various cover types, are postulated, based on other studies. Grid square values of mean monthly evapotranspiration are obtained. Iteration and optimization techniques can be applied to obtain 'best fit' fields of mean evapotranspiration and precipitation, consistent with mean runoff. Individual months of the International Field Year on the Great Lakes are then analyzed. Grid values of monthly 'deviations from normal' for the water balance variables are generated. The deviation fields are added to the normal fields to obtain monthly grid-area values of the water balance variables. These data can be used to generate monthly maps of 'lake evaporation', actual evapotranspiration, and other variables of interest. Results are compared at selected locations to estimates of evaporation obtained from the Thornthwaite and Penman methods. (See also W76-11275) (Sims - ISWS)
W76-11297

ASSESSMENT OF THE EFFECTS OF WASTE HEAT INPUTS ON WATER BUDGETS OF THE GREAT LAKES,
Acres Consulting Services, Ltd., Niagara Falls (Ontario).
For primary bibliographic entry see Field 5C.
W76-11305

PRELIMINARY ENERGY BUDGET OF LAKE ONTARIO FOR THE PERIOD MAY THROUGH NOVEMBER, 1972,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2H.
W76-11433

RANDOM MODEL OF EVAPORATION OF OIL AT SEA,
Mathematica, Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 5B.
W76-11462

A SIMPLE AND RAPID METHOD OF SOIL WATER DETERMINATION,
Himachal Pradesh Univ., Palampur (India). Coll. of Agriculture.
G. C. Aggarwal, and B. R. Tripathi.
Journal of Soil Science, Vol. 26, No. 4, p 437-439, December 1975. 1 tab, 2 ref.

Descriptors: *Soil water, *Soil texture, *Soil tests, *Moisture content, Soil density, Measurement, Instrumentation, Methodology.
Identifiers: *Pycnometers.

Soil water can be determined rapidly using a wide-mouthed pycnometer weighed after filling with a soil sample and a suitable amount of water. The particle density of the soil and weight of the water-filled pycnometer must be ascertained first; exact water volumes are unnecessary. Equations are provided for calculating the sample's dry weight and water content. This method gave water content values similar to those obtained by oven-drying when tested on seven soils varying in texture from sandy to silt clay loam, with pH from 5.8 to 8.2 and organic carbon from 0.14 to 1.35%. Water contents varied from 2.60 to 21.61 % by the oven-drying method and from 2.49 to 21.42% by the pycnometer method. This technique also takes into account the floating organic particles discarded in other methods, thus making it more suitable even for soils high in organic matter. (Jahns-Arizona)
W76-11506

SIMULATION OF THE WATER BALANCE OF SOIL COLUMNS AND FALLOW SOILS,
National Vegetable Research Station, Wellesbourne (England).
H. R. Rowse.
Journal of Soil Science, Vol. 26, No. 4, p 338-349, December 1975. 7 fig, 22 ref.

Descriptors: *Water balance, *Soil moisture, *Fallowing, *Evaporation, *Soil water movement, Soil dynamics, Soil types, Model studies, Flow, Diffusivity, Impact(Rainfall).

A model is described to predict water evaporation from and distribution in a soil column evaporating into a constant environment. The model is based on a numerical solution of the flow equation and requires only the column's initial water distribution, the equilibrium (air-dry) water content at the soil surface and the relationship between volumetric water content and diffusivity, the latter parameter being most important. Model predictions are in accord with a published analytical solution (Rose, 1968) and with experimental results. Water balance in a fallow field can be predicted with modifications to the model that allow for soil rewetting by rainfall and atmospheric changes above the soil. Since coarse sand had a distinct drying front, the method used to determine diffusivity was the main cause of disparity between the model and experimental results; sandy loam soils did not present this problem. Generally good agreement was obtained with the measured distribution of water deficits in the soil profile. (Jahns-Arizona)
W76-11510

THE PRINCIPAL ASPECTS OF DESALINATION OF SURFACE WATERS OF THE TROPICAL SOUTHWESTERN PACIFIC, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Noumea (New Caledonia). Centre ORSTOM de Noumea.
J. R. Donguy, C. Henin, and F. Rougerie.
Cah O R S T O M Ser Oceanogr. 12(3), p 179-186, 1974.

Descriptors: *Desalination, *Pacific Ocean, *Advection, Rainfall, Salinity, Surface waters, Tropical regions, Evaporation, Evapotranspiration.
Identifiers: *Polynesia.

In the SW tropical Pacific, desalted water has 2 origins: the W Pacific Ocean and N of Polynesia. The desalted water is usually generated in areas where rainfall is strong, and then carried away by zonal advection; the desalted area N of Polynesia could also be supplied by meridian advection through the equator.--Copyright 1975, Biological Abstracts, Inc.
W76-11539

2E. Streamflow and Runoff

HYDROLOGIC ASPECTS OF FLOOD MANAGEMENT IN THE CHEMUNG RIVER BASIN,
Cornell Univ., Ithaca, N. Y. School of Civil and Environmental Engineering.
W. H. Brutsaert.
Available from the National Technical Information Service, Springfield, Va., 22161, as PB-256 211, $4.00 in paper copy, $3.00 in microfiche. Completion Report, Water Resources and Marine Sciences Center, Cornell University, Ithaca, New York, (1976). 32 p, 6 fig, 3 tab, 26 ref. OWRT A-060-NY(1). 14-31-0001-5032, 14-34-0001-6033.

Descriptors: *Flood forecasting, *Flood peak, *Rainfall-runoff relationships, *Unit hydrographs, *Runoff forecasting, Hydrologic systems, Management, River basins, *New York, Runoff, Streams, Watershed management, Model studies.
Identifiers: Chemung River basin(NY).

The process of watershed runoff resulting from extreme and complex flood-producing rainstorms was analyzed by the nonlinear systems approach. As an extension of the classical unit hydrograph method, a watershed system can be modeled in terms of a Volterra integral series. In this research the optimal identification of the first and second order unit response functions was carried out by means of data collected during major historical flood events on several watersheds of the Chemung River Basin. The basins selected were: Tioga River (Tioga, Pa.), Cowanesque River (Lawrenceville, Pa.), Tuscarora Creek (South Addison, N. Y.), Cohocton River (Campbell, N. Y.) and Newton Creek (Elmira, N. Y.). The response functions were determined by a Galerkin-type procedure in terms of an orthogonal expansion by means of Chebyshev polynomials. The resulting formulation was tested with available data from Tropical Storm Agnes of June 1972, which brought about the biggest flood in the history of the Susquehanna Basin. It was found that the nonlinear watershed model yields a better prediction of the hydrograph of an exceptional flood than the classical linear approach. The performance of any model is sensitive to the assumed rainfall loss rates.
W76-11106

PRELIMINARY INVESTIGATIONS OF A HEADWATER CREEK IN EASTERN KENTUCKY,
Virginia Commonwealth Univ., Richmond. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W76-11284

STATISTICAL SUMMARIES OF INDIANA STREAMFLOW DATA,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 7C.
W76-11409

HYDROLOGIC DATA FOR URBAN STUDIES IN THE SAN ANTONIO, TEXAS METROPOLITAN AREA, 1974,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W76-11413

INFORMATION TRANSFER FOR STREAM DISCHARGE,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7A.
W76-11499

SEDIMENT YIELD AS RELATED TO A STOCHASTIC MODEL OF EPHERMERAL RUNOFF,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
For primary bibliographic entry see Field 2J.
W76-11512

INFLUENCE OF SIMPLIFICATIONS IN WATERSHED GEOMETRY IN SIMULATION OF SURFACE RUNOFF,
Agricultural Research Service, Tucson, Ariz.
For primary bibliographic entry see Field 2A.
W76-11517

2F. Groundwater

COMPUTER PROGRAM FOR THREE-DIMENSIONAL PLOTTINGS FROM IRREGULAR FINITE ELEMENT GRID,
California Univ., Davis. Dept. of Land, Air and Water Resources.
S. K. Gupta, M. W. Morrissey, J. Lonczak, and K. K. Tanji.
Available from the National Technecial Information Service, Springfield, Va 22161, as PB-256 568, $3.50 in paper copy, $3.00 in microfiche. Water Science and Engineering Papers 4010, March 1976, (California Water Resources Center Project UCAL-WRC-W-438)

Descriptors: *Computer programs, *Finite element analysis, Groundwater, Flow, *California, *Simulation analysis, Base flow, Aquifers, Model studies.
Identifiers: *Sutter Basin(Calif).

Three-dimensional plotting provides a means for interpretation and illustration of results and dynamic findings from finite element simulation. However, the computer graphic package as available at various computer centers requires data on a regular grid. It cannot be adopted for isoparametric finite elements since the elements are combinations of various shapes and sizes of trapezoids. Computer programs have been developed to interpolate the data from irregular finite element grid such that three-dimensional plottings can be generated to depict results from two or three dimensional finite element solution. The program developed has the option of generation of plots as viewed from various angles, varying number of contours and vertical scale. The capabilities of this program are illustrated by using specific examples of 3-D finite element solution of groundwater flow, Sutter Basin, California. (Snyder - California, Davis)
W76-11327

GROUND-WATER RESOURCES AND WATER USE IN SOUTHERN NAVAJO COUNTY, ARIZONA,
Geological Survey, Tucson, Ariz.
L. J. Mann.
Arizona Water Commission Phoenix, Bulletin 10, May 1976. 106 p, 6 fig, 4 plates, 6 tab, 24 ref, append.

Descriptors: *Groundwater resources, *Water quality, *Aquifer characteristics, *Hydrologic data, Water wells, Water utilization, Water supply, Water yield, Available water, Streamflow, Groundwater recharge, Water analysis, Chemical analysis, *Arizona.
Identifiers: Navajo County(Ariz).

The main source of water in the 3,400-square-mile area of southern Navajo County, Ariz., is the groundwater in storage in the Coconino aquifer, which underlies the entire area. About 76 percent of the water supply is from the Coconino aquifer, about 6 percent is from the Pinetop-Lakeside aquifer and from the alluvium along the large stream channels and flood plains, about 15 percent

is from surface water, and about 3 percent is imported. Most groundwater withdrawn from the Coconino aquifer is for agricultural and industrial uses, and, in general, water levels have declined less than 5 feet. The sedimentary and basaltic rocks of the Pinetop-Lakeside aquifer supply water to the Pinetop-Lakeside recreational area, where the water in some wells has been polluted by sewage effluent. The water in the Pinetop-Lakeside aquifer is hydraulically separated from the water in the underlying sandstone Coconino aquifer. In general the groundwater in the southern part of the area is of good chemical quality; however, the water in the northern part of the area generally contains large concentrations of dissolved solids--mainly sodium, chloride, and bicarbonate. In the northernmost part of the area water in the Coconino aquifer is unsuitable for human or livestock consumption, irrigation, and most industrial uses. (Woodard-USGS)
W76-11410

GROUND-WATER RECORDS FOR NORTHEASTERN OKLAHOMA: PART 1--RECORDS OF WELLS, TEST-HOLES, AND SPRINGS,
Geological Survey, Oklahoma City, Okla.
For primary bibliographic entry see Field 7C.
W76-11412

FEASIBILITY OF MODELLING THE INFLUENCES OF PIT RECHARGE ON GROUND-WATER LEVELS AND QUALITY IN ALLUVIAL BASINS,
Water Resources Research Center, Tucson.
L. G. Wilson, W. O. Rasmussen, and D. F. O'Donnell.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 584, $4.50 in paper copy, $3.00 in microfiche. Completion Report, July 1976. 66 p, 19 fig, 11 tab, 28 ref, append. OWRT A-056-ARIZ(2). 14-31-0001-5003.

Descriptors: Finite element analysis, Water wells, *Artificial recharge, *Pit recharge, Hydraulic models, *Model studies, *Arizona, Water quality, Groundwater movement, Aquifers.
Identifiers: *Tucson basin(Ariz), *Finite difference models.

Specific objectives included (1) examining the effect of pit recharge, using industrial blowdown effluent, on local ground-water levels and quality in the Tucson basin; and (2) evaluaing the applicability of two digital models for modelling the hydraulic response of the aquifer to pumping and recharge. Fourteen pit trials ranging from 1 day to 185 days duration were imlemented during a two year period. The total volume of effluent recharged was 157 ac-ft. Pit recharge on a limited basis did not appear to offset the general decline in local ground-water levels. However, recharge deteriorated the quality of ground water in shallow (150 ft) wells but not in a deeper (300 ft) well. A finite difference (FD) model and a finite element model (FEM) were used to simulate hydraulic conditions in a 2000 ft by 2000 ft aquifer region near the pit. An attempt was made to calibrate the models using water level data from a two-week aquifer test on a shallow well. Results were depicted using a three-dimensional graphics technique (SYMVU). Better results were obtained with the FD model than with the FEM, primarily because a finer mesh was used to discretize the region with the FD model than with the FEM. Results of the FEM were also biased by the rectangular configuration of the aquifer boundary. The finite element model was used to simulate aquifer response during a pit recharge test. Again, results were limited by the injudicious selection of elements and boundary configurations.
W76-11487

PROCEEDINGS TENTH BIENNIAL CONFERENCE ON GROUND WATER, TOTAL WATER MANAGEMENT FOR CALIFORNIA'S LONG-RANGE NEEDS.
California State Dept. of Water Resources, Scramento.
For primary bibliographic entry see Field 4B.
W76-11491

PETROGRAPHIC AND GEOHYDROLOGIC MODEL OF AQUIFER LIMESTONES IN FLORIDA,
Florida Univ., Gainesville. Dept. of Geology.
A. F. Randazzo.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-256 761 $4.50 in paper copy, $3.00 in microfiche. Florida Water Resources Research Center, Gainesville, Publication No. 35, 1976. 51 p, 17 fig, 4 tab, 74 ref. OWRT A-025-FLA(3), 14-34-0001-6010.

Descriptors: *Groundwater movements, *Porosity, *Permeability, *Florida, *Model studies, *Petrography, Aquifer characteristics, *Dolomite, Magnesium, Lithologic logs, Diagenesis.

Petrographic analysis of 14 cores penetrating the Inglis and Avon Park Formations (Floridan Aquifer) reveals several distinct lithofacies representing multiple regressive-transgressive cycles, aerial exposure, and diagenesis. Evolution of pore spaces varies with lithofacies and a function of primary deposition and diagenetic history. The general tendency has been toward obliteration of primary voids by compaction and calcite and dolomite infilling, but several zones have experienced dissolution enlargement. There is evidence for penecontemporaneous dolomitization in supratidal environment, as well as post-depositional dolomitization by Mg-rich groundwater flushing. Various dolomite textures can be used to predict the environment of dolomitization. These textures are: (1) replacement dolomitization of the total sediment so that original fabrics are preserved; (2) dolomitization by aggrading neomorphic processes; and (3) replacement dolomitization of fossils and pellets only. The petrographic model presented, provides the framework into which the known geohydrologic and hydrochemical models can be integrated. (Morgan-Florida)
W76-11493

GEOPHYSICAL PROSPECTING FOR GROUND WATER IN ALASKA,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4B.
W76-11496

MODELING SOLUTE TRANSPORT IN GROUND WATER,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 5B.
W76-11605

2G. Water In Soils

FRAGIPAN STABILITY IN SOIL-PLANT EFFLUENT DISPOSAL SYSTEMS,
Missouri Univ., Columbia. Dept. of Agronomy.
C. R. Edmonds, and R. W. Blanchar.
Available from the National Technical Information Service, Springfield, Va., 22161, as PB-256 228, $6.00 in paper copy, $3.00 in microfiche. Missouri Water Resources Research Center, Columbia, Completion Report, July 1, 1976. 133 p, 23 fig, 16 tab, 86 ref, append. OWRT A-087-MO(1), 14-34-0001-6026.

Descriptors: Effluents, *Hydraulic conductivity, *Soil strength, *Missouri, *Waste disposal, *Root development, Soil horizons, Soil profiles, *Acidity, *Bulk density, Lime, Root distribution, Root systems, Soil analysis.
Identifiers: *Fragipan horizon.

A large percentage of Ozark soils in Missouri possess a fragipan horizon. The fragipan restricts water movement and root growth in the profile. This study was conducted to evaluate the effect of changes in acidity and bulk density on the Hobson fragipan with respect to root growth and hydraulic conductivity. Chemical and physical tests associated with basic soil properties were conducted. Ion exchange relationships of six ion pairs, along with ion products of Fe, Al, and Mn hydroxides were examined. Hydraulic conductivity, probe penetration, and root growth experiments were conducted on reformed and natural samples of B2 and fragipan horizons. The rate of probe penetration had no effect on point resistance in reformed cores. Both acidity and high bulk density restrict root growth in the Hobson B2 and fragipan horizons. Data suggest low pH could induce Al toxicity in unlimed samples of both the B2 and fragipan soil. In reformed cores root growth was restricted at strengths between 10 and 20 bars, and greater strengths effectively stopped root growth. Strength of undisturbed B2 and fragipan cores was 20 to 25 bars and greater than 100 bars, respectively, at 0.33 bar moisture tension. No roots penetrated either core. The hydraulic conductivity of reformed cores was only slightly increased due to calcium oxide addition. Indications are the fragipan would remain stable with respect to roots and water movement unless it was physically modified. Profile modification would need to be supplemented with lime to effectively increase root distribution in the Hobson profile.
W76-11104

EFFECT OF DILUTED SEA WATER ON THE BASE STATUS OF AN ACID SOIL,
West Pakistan Agricultural Univ., Lyallpur. Dept. of Soil Sciences.
S. Muhammad.
Pak J Sci Res. 24(1/2), p 77-85, 1972.

Descriptors: *Sea water, *Acidic soils, Adsorption, Loam, Soil chemistry, Sodium, Magnesium, Leaching.

Columns of an acid Lauren loam soil were leached, with diluted sea water to study its effect on the exchangeable base status of the soil. One set of soil columns was leached with 33 acre-inches of SW/10 followed by 39 acre-inches of SW/1000 and the other set was leached with 33 acre-inches of SW/100 followed by 39 acre-inches of SW/1000. There were substantial gains in exchangeable Mg and Na and similar losses in Ca. The gains in H + Al increased with increasing initial base saturation of the soil. No soil column reached equilibrium with the leaching waters as indicated by continued adsorption of Mg by the soil and by differences in SAR (Na adsorption ratio) values of applied waters and ESP (exchangeable Na percentage) of the soil at the end of the experiment.--Copyright 1974, Biological Abstracts, Inc.
W76-11131

EFFECT OF TILLAGE SYSTEMS ON RUNOFF LOSSES OF PESTICIDES: A SIMULATED RAINFALL STUDY,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W76-11169

SOIL PROPERTIES AS AFFECTED BY TOPOGRAPHY IN DESERT WADIS,
Cairo Univ., Giza (Egypt). Faculty of Science.
K. H. Batanouny.
Acta Bot Acad Sci Hung. 19(1-4), p 13-21, 1973.

Descriptors: *Soil physical properties, Deserts, Africa, Physiography, Plant growth, *Soil depth, *Soil texture.
Identifiers: Topography, *Wadis.

Studies were carried out in one of the wadis of the Egypto-Arabian desert, namely wadi Hof near Helwan. The site studied was a part of the wadi, with numerous terraces and an irregular topography. Changes in the topography lead to the differentiation of a number of microhabitats spaced a few m apart. Each of them had their peculiar environmental conditions and plant cover. The soil properties, espececially texture and depth, played an important role in the plant life of the desert. This was mainly through through their controlling effect on the amount and availability of the water supply. It was shown that the soil properties varied widely in the different microhabitats. Such variation was referred to the topographic irregularities in the wadi. The physiographic features in a desert wadi, through their effect on the soil properties and in turn on the water resources, were the major factors affecting the distribution of the plant communities.--Copyright 1974, Biological Abstracts, Inc.
W76-11196

FALLOUT 137CS IN THE SOILS AND SEDIMENTS OF THREE SMALL WATERSHEDS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 5B.
W76-11453

RATIONALIZATION OF IONIC STRENGTH AND CATION EFFECTS ON PHOSPHATE SORPTION BY SOILS,
Massey Univ., Palmerston North (New Zealand). Dept. of Soil Science.
J. C. Ryden, and J. K. Syers.
Journal of Soil Science, Vol. 26, No. 4, p 395-406, December 1975. 2 tab, 4 fig, 23 ref.

Descriptors: *Phosphates, *Cations, *Cation adsorption, *Ion exchange, *Sorption, Soil chemistry, Soil dynamics, Kinetics, Isotherms, Soil investigations, Equilibrium.

Inorganic phosphate amounts sorbed by four contrasting unfertilized soils over a 40-hour period were influenced by the ionic strength and cation species of the contacting solution (support medium), as indicated by isotherms over the final P concentration range of 0 to 1 and 0 to 10 micro-g P/ml. P sorption was enhanced by increases in ionic strength, especially in support media with increasing Na or Ca concentrations. Sorption is also influenced by pH. Kinetic studies revealed that, within the P addition range used for each soil, equilibrium P concentration was independent of ionic strength and cation species; solution composition thus affected only the rate at which equilibrium was achieved. Results are due to the influence of ionic strength on the surface charge of retaining components and diffuse double layer thickness, along with effects of specific sorption of a divalent cation on surface charge, as they relate to P sorption rates. A support medium should reflect cation status as well as ionic strength of the system's aqueous phase. (Jahns-Arizona)
W76-11507

SIMULATION OF THE WATER BALANCE OF SOIL COLUMNS AND FALLOW SOILS,
National Vegetable Research Station, Wellesbourne (England).
For primary bibliographic entry see Field 2D.
W76-11510

EVOLUTION OF THE CATIONS INVOLVED IN RAIN, CANOPY LEACHATE AND DRAINAGE WATER THROUGH A FOREST ECOSYSTEM, (IN FRENCH),
Washington Univ., Seattle. Coll. of Forest Resources.
M. Rapp, and D. W. Cole.
Ann Sci For. 30(2), p 175-190, 1973.

Descriptors: *Cations, *Leachate, Drainage water, Forests, Ecosystems, Rainfall, Sodium, Calcium, Potassium, Soils, *Pacific Northwest U. S., Solubility, *Forest soils, Magnesium.

The change of Na, K, Ca and Mg in the precipitations after their penetration and transport through the soil was studied in a Douglas fir forest in Northwestern USA, by using tension lysimeters. The balance sheet of the 4 cations, moving in dissolved phase, was established for the whole ecosystem and the soil subsystem. The variations of the concentration of the soil solution at different depths was established. Some mechanisms are suggested for the solubility and for the transport of cations in forest soil. --Copyright 1974, Biological Abstracts, Inc.
W76-11540

DECREASE OF STRONTIUM-90 CONTENT IN THE TUNDRA SOIL-VEGETATION COVER, (IN RUSSIAN),
Ural Science Center, Sverdlovsk (USSR). Inst. of Plant and Animal Ecology.
For primary bibliographic entry see Field 2K.
W76-11565

2H. Lakes

A SURVEY OF THE PHYSICAL LIMNOLOGY OF GREAT SALT LAKE,
Utah Center for Water Resources Research, Logan.
A. Lin.
Available from the National Technical Information Service, Springfield, Va., 22161, as PB-256 210, $5.00 in paper copy, $3.00 in microfiche. Printed by Utah Division of Water Resources--Comprehensive Water Planning Program, Salt Lake City, (1976). 82 p, 18 fig, 1 tab, 22 ref, 3 append. OWRT A-029-UTAH(1). 14-31-0001-5045.

Descriptors: *Limnology, Lakes, Density flow, Seiches, Circulation, Mixing, *Stratification, Waves(Water), Diffusion, Currents(Water), Dispersion, Interfaces, *Great Salt Lake, *Utah, Surveys, Turbulent flow, Model studies.
Identifiers: *Lake currents, *Chemocline, *Physical limnology, Turbulent diffusion, Halocline oscillations.

This study summarizes some results of physical processes on the Great Salt Lake. Of some interest to limnologists is the meromixis (sustained two-layer stratification) in the south basin. The conspicuous two-layer was made possible by the presence of the railroad causeway. The stable stratification is demonstrated in the records of the last 15 years. The rate of entrainment of the chemocline obeys the general rules applicable to other large two-layer basins. The large-scale motion takes place more than 50 percent of the time. In the winter, the lake is calmer and most violent in late spring and early summer. The period of the fundamental surface wave was 6.0 hours on the record as compared to 5.43 hours obtained from a computation for the frictionless, rotationless Great Salt Lake. The discrepancy is accounted for by the effect of rotation and damping with a prognostic model. Time and space variations of the diffusion parameters are pronounced. The variation is attributable to the transient nature of the large-scale water movement frequently encountered, boundary influence from islands, spits or bars, and dynamics associated with the two-layer structure in the south basin. Oscillation of the halocline is substantial; typical period of oscillation is of the order of 35.0 hours, according to some preliminary field recordings.
W76-11107

UTILIZATION OF STREAM-BORNE PHOSPHORUS BY CAYUGA LAKE PHYTOPLANKTON,
Cornell Univ., Ithaca, N. Y.
For primary bibliographic entry see Field 5C.
W76-11108

VEGETATION MAPPING IN LAKE CHAMPLAIN WETLANDS,
Vermont Univ., Burlington. Dept. of Geography.
For primary bibliographic entry see Field 4A.
W76-11111

CHLORIDE MANAGEMENT IN LAKE ERIE BASIN,
State Univ. of New York at Buffalo. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W76-11114

RELATIONSHIP BETWEEN WATER QUALITY AND PLANT GROWTH IN PONDS,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Soils and Crops.
For primary bibliographic entry see Field 5C.
W76-11170

THE EFFECTS OF VARIATIONS IN TURBIDITY ON CYCLES OF PLANKTONIC AND BENTHIC ORGANISMS IN FLOOD CONTROL RESERVOIRS,
Mississippi Univ., Dept. of Biology.
For primary bibliographic entry see Field 5C.
W76-11172

LONG-TERM ACIDIFICATION OF A LAKE AND RESULTING EFFECTS ON FISHES,
Fisheries and Marine Service, Nanaimo (British Columbia). Biological Station.
For primary bibliographic entry see Field 5C.
W76-11178

SEASONAL MORTALITY OF RAINBOW TROUT (SALMO GAIRDNERI) PLANTED IN SMALLL EUTROPHIC LAKES OF CENTRAL CANADA,
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5C.
W76-11179

X-RAY DIFFRACTION AND ELECTRON BEAM ANALYSIS OF ASBESTIFORM MINERALS IN LAKE SUPERIOR WATERS,
National Water Quality Lab., Duluth, Minn.
For primary bibliographic entry see Field 5A.
W76-11248

PROCEEDINGS, SEVENTEENTH CONFERENCE ON GREAT LAKES RESEARCH, PART 1.
Proceedings of a Conference held August 12-14, 1974, McMaster University, Hamilton (Ontario). International Association for Great Lakes Research, Robert A. Sweeney, Treasurer, State University College, Great Lakes Laboratory, Buffalo, New York, 1974. 617 p.

Descriptors: *Great Lakes, *Limnology, *Water quality, *Biology, Aquatic life, Pollutants, Water pollution, Sediments, Sedimentation, Meteorology, Water temperature, Powerplants, Cooling water, Bacteria, Phytoplankton, Nutrients, Pesticides, Remote sensing, Model studies, Lakes.

The papers of this conference were grouped under the general headings of biology, geology/geochemistry, meteorology/hydrology, physical limnology, and water quality. A wide variety of research on the Great Lakes was reported. Many of the papers dealt with research related to the International Field Year for the Great Lakes (IFYGL), a North American contribution to the International Hydrologic Decade (IHD). The busi-

ness meetings minutes, treasurer's report, bylaws, and membership list for the International Association for Great Lakes Research were included in this volume. (See W76-11276 thru W76-11324) (Sims - ISWS)
W76-11275

CRUSTACEAN ZOOPLANKTON OF SOUTHWESTERN LAKE ONTARIO IN 1972 DURING THE INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES,
State Univ. Coll., Buffalo, N.Y. Great Lakes Lab.
S. C. Czaika.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 1-16, 1974. 3 fig, 2 tab, 39 ref. EPA R800701.

Descriptors: *Zooplankton, *Crustaceans, *Lake Ontario, *Great Lakes, Aquatic animals, Aquatic life, Aquatic microorganisms, Copepods, Shellfish, Surveys, Sampling, Biomass, On-site investigations, Lakes, Biology, Limnology.
Identifiers: *International Field Year for the Great Lakes.

The sampling matrix had seven transects perpendicular to shore running from Port Weller to Rochester with three stations in each transect at 1/2, 4, and 8 km from shore. Sampling was conducted during ten cruises from mid-April to mid-December, 1972. Copepod nauplii were the most abundant identification group followed by bosminids with mucro and immature cyclopoid copepodids. The other common identification groups in decreasing order of abundance were Daphnia retrocurva, Ceriodaphia lacustris, Cyclops biscuspidatus thomasi, Tropocyclops prasinus mexicanus, immature calanoid copepodids, and Eubosmina coregoni. With the exception of E. coregoni, these groups peaked in September and October. The common cladocerans exhibited the typical cladoceran pattern of winter and spring absence followed by very high maxima in late summer and early fall, especially closest to shore. Several species were encountered which have not been reported previously from Lake Ontario. Among these are perhaps three species of Alona, Camptocercus rectirostris, Eurycercus lamellatus, a species of Eucyclops, and five species of harpacticoid copepods (Bryocamptus nivalis, Canthocamptus robertcokeri, Canthocamptus staphylinoides, Mesochra alaskana, Moraria cristata). (See also W76-11275) (Sims-ISWS)
W76-11276

VERTICAL INTERACTIONS IN PHYTOPLANKTON POPULATIONS - AN ASYMPTOTIC EIGENVALUE ANALYSIS,
Manhattan Coll., Bronx, N.Y. Environmental Engineering and Science Graduate Program.
D. M. DiToro.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 17-27, 1974. 11 fig, 15 ref, 1 append. EPA R800610.

Descriptors: *Phytoplankton, *Plant populations, *Model studies, *Great Lakes, Aquatic populations, Aquatic plants, Biomass, Growth rates, Mathematical models, Analytical techniques, Buoyancy, Dispersion, Settling velocity, Lakes, Biology, Limnology.
Identifiers: *International Field Year for the Great Lakes.

An analysis of the one-dimensional vertical phytoplankton biomass equation indicated that if the population biomass is increasing, then asymptotically the log growth rate of the population will approach a value independent of depth. An examination of data from four bodies of water supported this theoretical prediction. For constant spatial variations of the parameters with the exception of an exponentially decreasing growth rate, the asymptotic growth rate of the population is related to the important dimensionless parameter groups. In particular, settling velocity effects were examined, together with their interactions with vertical dispersion, and euphotic zone depth. The results were presented in a series of dimensionless plots. (See also W76-11275) (Sims-ISWS)
W76-11277

THE CRUSTACEAN ZOOPLANKTON OF GREEN BAY, LAKE MICHIGAN,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
J. E. Gannon.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 28-51, 1974. 10 fig, 1 tab, 42 ref.

Descriptors: *Zooplankton, *Crustaceans, *Bays, *Lake Michigan, *Great Lakes, Copepods, Aquatic life, Aquatic animals, Aquatic microorganisms, Rivers, Water pollution, Pollutants, Nutrients, Biomass, Surveys, Sampling, On-site investigations, Biology, Limnology.
Identifiers: *Green Bay(Wis).

Crustacean zooplankton were investigated in Green Bay during 1969-70. Thirty-four limnetic species and 12 littoral species were collected. Zooplankton community structure is similar in northern Green Bay, Little and Big Bay de Noc, and Lake Michigan. However, the zooplankton community is substantially different in southern Green Bay. The southeastern portion of the bay is strongly influenced by the inflow of nutrient-laden waters of the Fox River. Standing crop of zooplankton is generally higher in the zone of Fox River influence. Many species common in the plankton of Lake Winnebago are transported through the Fox River and have established populations in southern Green Bay. Many of these species are rare or absent elsewhere in the Lake Michigan basin. Many large species that have become rare in Lake Michigan in recent years due to size-selective predation by alewife are still abundant in Green Bay. The impact of fish predation by alewife and smelt on the larger zooplankton species appears to be buffered by recruitment of these zooplankters into the population both from higher rates of production in the eutrophic Green Bay waters and from dispersal of individuals into Green Bay from Lake Winnebago by way of the Fox River. (See also W76-11275) (Sims-ISWS)
W76-11278

DIELDRIN AND DDT: ACCUMULATION FROM WATER AND FOOD BY LAKE TROUT (SALVELINUS NAMAYCUSH) IN THE LABORATORY,
Bureau of Commercial Fisheries, Ann Arbor, Mich. Great Lakes Fishery Lab.
For primary bibliographic entry see Field 5C.
W76-11279

LABORATORY ESTIMATES OF THE SEASONAL FINAL TEMPERATURE PREFERENDA OF SOME LAKE ERIE FISH,
Ohio State Univ., Put-in-Bay. Center for Lake Erie Area Research.
J. M. Reutter, and C. E. Herdendorf.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 59-67, 1974. 3 fig, 1 tab, 11 ref.

Descriptors: *Fish behavior, *Water temperature, *Thermal pollution, *Lake Erie, Temperature, Seasonal, Fish, Laboratory tests, Powerplants, Water pollution, Freshwater fish, Lakes, Environmental effects, Biology.
Identifiers: *Water temperature preferences.

Since June 1971, Ohio State University, in cooperation with the Ohio Division of Wildlife and the U.S. Bureau of Sport Fisheries and Wildlife, has conducted experiments to determine the seasonal final temperature preferenda of over 2000 Lake Erie fish of 24 species. Temperature preferenda which were measured in a horizontal temperature gradient tank, varied by species, season, and age. Fish were held at lake temperature prior to testing. All species tested preferred temperatures above lake temperature during fall, winter, and spring. Summer temperature preferenda were approximately equal to or slightly higher than lake temperatures. Barricades were necessary in fall, winter, and spring since all species tested would swim into lethal hot water faster than they could acclimate to it. (See also W76-11275) (Sims-ISWS)
W76-11280

MIGRATORY BEHAVIOR OF FISH TAGGED AT A NUCLEAR POWER PLANT DISCHARGE INTO LAKE MICHIGAN,
Argonne National Lab., Ill. Radiological and Environmental Research Div.
G. P. Romberg, S. A. Spigarelli, W. Prepejchal, and M. M. Thommes.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14. International Association for Great Lakes Research, p 68-77, 1974. 6 fig, 3 tab, 14 ref.

Descriptors: *Fish behavior, *Fish migration, *Thermal pollution, *Lake Michigan, Temperature, Water temperature, Fish, Freshwater fish, Trout, Lake trout, Salmon, Tagging, Environmental effects, Powerplants, Water pollution, Biology.
Identifiers: *Water temperature preference.

With the proliferation of nuclear power plants on Lake Michigan, much concern has been expressed over the effects of plume 'residence' and abnormal temperature exposures on the physiology and migratory behavior of important fish species. A mark and recapture study was conducted at the Point Beach Nuclear Plant to describe the migratory behavior of fish at this thermal discharge. A total of 1781 fish (7 species) were captured, tagged and released during 1972 and 1973. As of August 1, 1974, 14% of the tagged fish were recaptured, primarily by sport fisherman. Eighty-four percent of the recaptures by fishermen occurred at locations other than Point Beach, and the number or recaptures generally decreased with distance. Rainbow trout tended to be the most migratory, but individuals of each species showed extensive movements. Experimental temperature-sensitive fish tags indicated that the majority of fish recaptured at Point Beach spent less than 10% of their time at discharge temperature. Brown trout exhibited a stronger attraction to discharge waters than did rainbow trout or chinook salmon. High percentages of recapture for most species suggest negligible mortalities due to plume 'residence' or the tagging procedure and imply that Lake Michigan sport fishermen are annually harvesting a substantial proportion of the fish stocks. (See also W76-11275) (Sims - ISWS)
W76-11281

STORM INDUCED RELATIONSHIPS AMONG CHEMICAL CONDITIONS AND PHYTOPLANKTON IN SAGINAW BAY AND WESTERN LAKE HURON,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
For primary bibliographic entry see Field 5C.
W76-11282

CHANGES IN PHYTOPLANKTON FOLLOWING NITRATE PHOSPHATE ADDITIONS TO LARGE ENCLOSURES IN MARION LAKE, BRITISH COLUMBIA,
Ottawa Univ. (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W76-11283

TEMPORAL AND SPATIAL DISTRIBUTIONS OF PLANKTONIC ROTIFERS IN MILWAUKEE HARBOR AND ADJACENT LAKE MICHIGAN,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
R. S. Stemberger.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 120-134, 1974. 16 fig, 1 tab, 24 ref.

Descriptors: *Rotifers, Harbors, *Lake Michigan, *Great Lakes, Plankton, Zooplankton, Sampling, Surveys, Seasonal, Spatial distribution, Benthic fauna, Temperature, Epilimnion, Biology, Limnology.
Identifiers: *Milwaukee(Wis).

Twenty-nine species of limnetic rotifers were prominent in the open waters off Milwaukee, Wisconsin, July 1972 to June 1973. Nine additional species were of rare or solitary occurrence. Eleven limnetic species were recorded for the first time in Lake Michigan. The predominant genera were Polyarthra, Keratella, Synchaeta and Notholca. Significant inshore-offshore differences in abundance and species composition were observed. The rotifer community in Milwaukee Harbor was composed mainly of benthic and littoral species as well as limnetic species characteristic of eutrophic waters. Pronounced vertical differences in distribution of species existed during thermal stratification. Rotifers were distributed during the late morning hours predominantly in the lower depths of the epilimnion and in the vicinity of the metalimnion. Currents and turbulence generated during high winds can distribute rotifers more uniformly throughout the epilimnion. The seasonal abundance of rotifers appears trimodal with two major peaks in July and September and a minor one in October. (See also W76-11275) (Sims - ISWS)
W76-11285

MODELING OF PHYTOPLANKTON IN LAKE ONTARIO,
Manhattan Coll., Bronx, N. Y. Environmental Engineering and Science.
For primary bibliographic entry see Field 5C.
W76-11286

PLUTONIUM DISTRIBUTION IN LAKE MICHIGAN BIOTA,
Argonne National Lab., Ill. Radiological and Environmental Research Div.
E. M. Yaguchi, B. J. Waller, and J. S. Marshall.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 150-157, 1974. 3 fig, 2 tab, 22 ref.

Descriptors: *Biota, *Radioisotopes, *Lake Michigan, Surveys, Sampling, Food chains, Water pollution, Pollutants, Analytical techniques, Nuclear wastes, Radioactive wastes, Plankton, Zooplankton, Phytoplankton, Algae, Benthic fauna, Fish, Chemistry, Biology, Limnology.
Identifiers: *Plutonium.

Samples of plankton, algae, benthic invertebrates, and eight fish species were collected from Lake Michigan during 1972 and 1973. After ashing, the samples were analyzed by radiochemical methods and gamma-ray spectrometry for Pu239, Sr90, and Cs137, all of which are components of fallout from atmospheric tests of nuclear weapons. Analyses indicated that Pu239 was scavenged from Lake Michigan water by phytoplankton and attached algae with a concentration factor of up to 10,000. In each of two food chains considered, a progressive discrimination against Pu239 was observed at successive trophic levels: (1) phytoplankton to zooplankton to planktivorous fish to piscivorous fish, and (2) benthic invertebrates to bottom-feeding fish. The benthic invertebrates and fish had somewhat higher Pu239 concentrations than their pelagic counter-parts, presumably because of their ingestion of sediments. Ash content was correlated with Pu239 concentrations in samples of plankton and fish. (See also W76-11275) (Sims - ISWS)
W76-11287

PHOSPHORUS MOBILITY IN LAKE ONTARIO SEDIMENTS,
Wisconsin Univ., Madison. Water Chemistry Lab.
For primary bibliographic entry see Field 5B.
W76-11288

THE STRATIGRAPHY OF NORTHERN LAKE SUPERIOR LATE-GLACIAL AND POSTGLACIAL SEDIMENTS.
Canada Centre for Inland Waters, Burlington (Ontario),
For primary bibliographic entry see Field 2J.
W76-11289

GROYNE STABILIZATION OF SLOPE MOVEMENTS AND TOE EROSION, LAKE HURON NEAR BAYFIELD, ONTARIO,
University of Western Ontario, London. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W76-11290

BIOLOGICAL TRANSFORMATION OF CLAY-SIZED SEDIMENTS IN SIMULATED AQUATIC ENVIRONMENTS,
Guelph Univ. (Ontario), Dept. of Land Resource Science.
For primary bibliographic entry see Field 2J.
W76-11291

STUDIES OF PLUTONIUM CYCLING AND SEDIMENTATION IN LAKE MICHIGAN,
Argonne National Lab., Ill. Radiological and Environmental Research Div.
For primary bibliographic entry see Field 5B.
W76-11292

OCCURRENCE OF AS, CD, CO, CR, CU, FE, HG, NI, SB, AND ZN IN LAKE ERIE SEDIMENTS,
Bowling Green State Univ., Ohio. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W76-11293

POLLUTANT MERCURY AND SEDIMENTATION IN THE WESTERN BASIN OF LAKE ERIE,
Bowling Green State Univ., Ohio. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W76-11294

THE RADIATION BUDGET OF LAKE ONTARIO,
Center for the Environment and Man, Inc., Hartford, Conn.
M. A. Atwater.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 250-258, 1974. 9 fig, 3 tab, 8 ref. NOAA 2-35353, NSF GA-31296.

Descriptors: *Model studies, *Radiation, *Lake Ontario, Solar radiation, Infrared radiation, Heat budget, Albedo, Mathematical models, Computer models, Clouds, Water vapor, Carbon dioxide, On-site data collections, Atmosphere, Meteorology.
Identifiers: *International Field Year for the Great Lakes, *Radiation budget, Net radiation.

A horizontal array of 30 grid points was used to compute the radiation budget for Lake Ontario during the International Field Year of the Great Lakes (IFYGL). A weighted-average analysis method computed meteorological variables, including cloud amounts, at each grid point from surface observations. The radiation model was designed for accuracy, economy, efficiency and the inclusion of major physical processes that alter radiative fluxes. Downward and upward solar and infrared radiative fluxes were computed utilizing empirical transmission functions for absorbers, scatterers, and clouds. Observations taken during IFYGL were compared with time-integrated numerical results at selected sites. The differences are analyzed and changes in the numerical model were described. Results were presented for the net radiation balance for Lake Ontario during IFYGL and were compared with results based on observations. (See also W76-11275) (Sims - ISWS)
W76-11295

A STUDY OF LAKE-LAND BREEZE CIRCULATION OVER LAKE ONTARIO FROM IFYGL BUOY OBSERVATIONS,
National Oceanic and Atmospheric Administration, Washington, D. C. Center for Experiment Design and Data Analysis; and National Oceanic and Atmospheric Administration, Washington, D. C. Environmental Data Service.
J. K. S. Ching.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 259-268, 1974. 10 fig, 2 tab, 6 ref.

Descriptors: *Lake breezes, *Land breezes, *Air circulation, *Lake Ontario, Diurnal, Winds, Buoys, Temperature, Water temperature, Lakes, Atmosphere, Limnology, Meteorology.
Identifiers: *International Field Year for the Great Lakes, Divergence, Vorticity.

Data from both the United States and Canadian meteorological buoys were classified and averaged in terms of proximity to the northern, middle, and southern trisections of Lake Ontario. The diurnal variation of the averaged v wind component for these trisections was computed for a two week period in July 1972. A significant diurnal variation was found in all three cases, with the largest amplitude in the southern region. After subtracting the variations of the flow in the middle of the lake, which was assumed attributable to other scales of motion, from the northern and southern variations, a lake-land breeze circulation became apparent. The flow in the northern and southern sectors were almost in phase, of about equal magnitude (about 3/4 m/sec), and of opposite sign. The changes from land-to-lake and lake-to-land breeze occur at 10 a.m. and 10 p.m. local time, respectively. The variations in the computed vorticity, divergence, and curl of surface stress attributed to lake-land breeze circulation were discussed. (See also W76-11275) (Sims - ISWS)
W76-11296

MONTHLY EVAPOTRANSPIRATION ESTIMATES FOR THE CANADIAN LAND PORTION OF THE LAKE ONTARIO BASIN DURING THE IFYGL,
Atmospheric Environment Service, Downsview (Ontario), Hydrometeorology and Environmental Impact Research Div.

For primary bibliographic entry see Field 2D.
W76-11297

TURBULENT KINETIC ENERGY BALANCE NEAR THE FROZEN SURFACE OF EASTERN LAKE ONTARIO,
York Univ., Downsview (Ontario). Dept. of Physics.
C. S. Maddukuri, and W. R. Frisken.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 288-295, 1974. 3 fig, 2 tab, 32 ref.

Descriptors: *Energy budget, *Energy transfer, *Ice, *Lake Ontario, Stability, Turbulence, Anemometers, Ice cover, Surfaces, Boundary layers, Lakes, Heat, Heat flow, Heat balance, Atmosphere, Meteorology, On-site investigations.
Identifiers: *International Field Year for the Great Lakes, Kinetic energy, Energy balance.

During February and March of 1973, direct measurements were made of turbulent fluxes of momentum and heat in the boundary layer using an ultrasonic anemometer mounted 2.67 m above the ice surface. These data were used to compute the kinetic energy balance in the boundary layer over the frozen water surface of Lake Ontario. Integrated statistics obtained in this study showed that the nature of the turbulence is similar to that observed at other sites over land and water. However, a plot of ratio of the variances of vertical and longitudinal velocity fluctuations against the stability parameter did not show any rapid transition as stability changes from stable to unstable. The values of various terms in the equation for the turbulent kinetic energy budget computed from the data were significantly less than those reported for studies over land and water surfaces. This is due to the smoothness of the ice surface and the light winds prevailing during the experiment. For nearly neutral conditions, the local production of turbulent energy is balanced by the local dissipation, in agreement with others. For unstable and slightly stable conditions the dissipation is not balanced by production. Very stable cases were not considered because of considerable anisotropy. (See also W76-11275) (Sims - ISWS)
W76-11298

IFYGL WEATHER HIGHLIGHTS,
Atmospheric Environment Service, Toronto (Ontario). Lake and Marine Applications Section.
For primary bibliographic entry see Field 2B.
W76-11299

GREAT LAKES TEMPERATURE MAPS BY SATELLITE,
National Environmental Satellite Service, Washington, D. C.
A. E. Strong.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 321-333, 1974. 14 fig, 8 ref.

Descriptors: *Remote sensing, *Temperature, *Great Lakes, Satellites(Artificial), Maps, Lake, Ice, Ice cover, Clouds, Water temperature, Infrared radiation, Instrumentation, Limnology.
Identifiers: *International Field Year for the Great Lakes, NOAA-2, *Temperature maps(Lakes).

Five case studies using Very High Resolution Radiometer data from the NOAA-2 satellite were presented. They demonstrated a capability for monitoring surface temperatures of the Great Lakes from space. Comparisons of this data with data available from more conventional sources were used to illustrate: (1) isothermal conditions, (2) thermal-bar circulations, (3) diurnal variability, and (4) summer upwelling. Examples presented showed the potential for using satellite observations routinely to monitor surface temperatures of the Great Lakes. (See also W76-11275) (Sims - ISWS)
W76-11300

SELECTED SATELLITE DATA ON SNOW AND ICE IN THE GREAT LAKES BASIN 1972-73,
National Environmental Satellite Service, Washington, D. C.
For primary bibliographic entry see Field 2C.
W76-11301

NEARSHORE CURRENTS AND WATER TEMPERATURES ALONG THE NORTH SHORE OF LAKE ONTARIO BETWEEN PICKERING AND COBOURG,
Ontario HYDRO, Toronto. Hydraulic Studies Dept.
A. A. Arajs, and R. Farooqui.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 348-357, 1974. 10 fig, 2 tab, 3 ref.

Descriptors: *Currents(Water), *Water temperature, *Lake Ontario, *Great Lakes, Buoys, Current meters, Temperature, Lakes, Winds, Shores, On-site investigations, On-site data collections, Surveys, Sampling, Limnology.
Identifiers: *International Field Year for the Great Lakes.

In 1972 as part of Ontario Hydro's contribution to IFYGL and also in continuation of its hydrologic and environment studies, a program of lake current and water temperature measurements was carried out at four sites along a 100 km stretch of the north shore of Lake Ontario between Toronto and Cobourg. Current and temperature recorders were installed at various depths within a band of 2 km offshore and maintained from April to November. Results indicated that water movement was predominantly longshore all locations. Resultant transport was westward at all sites, except Pickering. Maximum current speeds were in the order of 30 cm/sec. Water temperatures indicated similarity at all sites; surface warming in spring, complete stratification including up- and down-welling in summer, and isothermal conditions in fall. (See also W76-11275) (Sims - ISWS)
W76-11302

POINT PETRE STORM SURGES SIMULATION,
Department of the Environment, Ottawa (Ontario). Marine Environmental Data Service; and Department of the Environment, Ottawa (Ontario). Ocean and Aquatic Affairs.
P-A. Bolduc.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 358-368, 1974. 11 fig, 3 ref.

Descriptors: *Model studies, *Storm surge, *Lake Ontario, Mathematical models, Statistical models, Winds, Wind velocity, Wind tides, Surges, Waves(Water), Seiches, Water levels, Water level recorders, Water level fluctuations, Limnology.
Identifiers: *Point Petre(Ontario).

Frequency distribution of water level differences between on shore and off shore measurements were illustrated and analyzed from July to December 1971 for Point Petre on Lake Ontario. The technique enabled a quality check on the off shore water level measurement, the critical part of the data. Positive differences between the on shore and off shore measurements suggested water level set-up during storm activities. Six different storm periods (A through F) were presented. Correlation of the wind with the resultant water level difference was quite high (minimum value being 0.72). Using storm A for calibration, two different models were proposed to simulate the water set-up from the wind data for storms B through F. The first model is a mathematical model. The largest and smallest root mean square value of the differences between the observed and predicted set-up for this type of model were respectively 0.087 m for storm B and 0.050 m for storm F. The second model is a statistical model based on linear regression. A polynomial equation of the sixth order was defined from storm A. The fit between the observed and predicted water level differences (set-up) for the five storms was improved using the polynomial equation. The maximum and minimum root mean square values were 0.061 m for storm C and 0.039 m for storm D. The type of phenomenon observed at Point Petre suggests that on shore water level measurements do not give a real picture of the mean water level of the lake (a value used for regulation) during storm activities, the build-up of the water being mainly a shore process. (See also W76-11275) (Sims - ISWS)
W76-11303

GENERALIZED PROFILES OF WIND SPEED, TEMPERATURE AND HUMIDITY,
Canada Centre for Inland Waters, Burlington (Ontario).
M. A. Donelan, K. N. Birch, and D. C. Beesley.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 369-388, 1974. 14 fig, 16 ref.

Descriptors: *Wind velocity, *Temperature, *Humidity, *Lake Ontario, Measurement, Instrumentation, Towers, Winds, Air temperature, On-site investigations, On-site data collections, Data processing, Analytical techniques, Lakes, Shores, Atmosphere, Stability, Boundary layers, Meteorology.
Identifiers: *Over-water measurements, Wind profiles, Temperature profiles.

Throughout the four boundary layer active periods of the IFYGL, ten minute averaged profiles were measured from a tower off Niagara-on-the-Lake. This paper described the measurement system and summarized the profiles by a set of non-dimensional functions of stability which would allow one to construct profiles knowing only the air-water differences of the three primary stability determining paramenters: wind speed, temperature and humidity. (See also W76-11275) (Sims - ISWS)
W76-11304

ASSESSMENT OF THE EFFECTS OF WASTE HEAT INPUTS ON WATER BUDGETS OF THE GREAT LAKES,
Acres Consulting Services, Ltd., Niagara Falls (Ontario).
For primary bibliographic entry see Field 5C.
W76-11305

HELMHOLTZ RESONANCE IN HARBOURS OF THE GREAT LAKES,
Canada Centre for Inland Waters, Burlington (Ontario).
N. G. Freeman, P. F. Hamblin, and T. S. Murty.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 399-411, 1974. 9 fig, 1 tab, 9 ref.

Descriptors: *Resonance, *Harbors, *Model studies, *Great Lakes, Waves(Water), Mathematical models, Analytical techniques, Lakes, Bays, Hydrodynamics, Hydraulics, Limnology.
Identifiers: *Helmholtz resonance.

Helmholtz resonance basically represents the balance between the kinetic energy of the water

flowing in through a narrow connecting channel, and the potential energy from the rise in mean water level within the harbor. It is an additional gravitational mode of substantially longer period than fundamental free oscillation and can be significant in the contamination of spectra of water levels collected in harbors and in the consideration of harbor flushing times. Theoretical estimates for the Helmholtz periods for an idealized multi-channel basin were computed by means of a multi-degree of freedom resonator and for a more realistic geometry by means of a numerical model. Power spectral analysis of water level records measured during the IFYGL study compared favorably with the theoretical predictions for the Toronto and Hamilton harbors. The Helmholtz resonator model is less satisfactory in dealing with bays with complicated entrance geometry, and it was demonstrated that a co-oscillation model is more appropriate. (See also W76-11275) (Sims - ISWS)
W76-11306

FIELD OBSERVATIONS OF THE DYNAMICS OF HEATED DISCHARGE JETS,
Argonne National Lab., Ill. Energy and Environmental Systems Div.
For primary bibliographic entry see Field 5B.
W76-11307

VERTICAL MIXING CHARACTERISTICS IN THE THERMOCLINE AND HYPOLIMNION REGIONS OF LAKE ONTARIO,
Copenhagen Univ., Denmark. Inst. of Physical Oceanography.
G. Kullenberg, C. R. Murthy, and H. Westerberg.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 425-434, 1974. 7 fig, 2 tab, 20 ref.

Descriptors: *Mixing, *Thermocline, *Hypolimnion, *Lake Ontario, Tracer, Dye releases, Fluorescent dye, Temperature, Water temperature, Energy dissipation, Lakes, On-site investigations, Hydrodynamics, Limnology.
Identifiers: *International Field Year for the Great Lakes, Vertical mixing.

The instantaneous point-source, sub-surface dye diffusion experiments carried out during the IFYGL were used to study the small-scale vertical mixing in relation to the vertical temperature and current structure. The experiments covered time scales from 5 to 80 hours as well as a wide range of environmental conditions. In the vertical direction, the dye distribution exhibited a layered structure which apparently is related to the density and current structures in the water column. Several types of dye layers were observed. The close relation between the dye distribution and the small-scale temperature structure was shown, and possible layer generating mechanism were discussed, such as advective processes, wave generated overturning instabilities, and shear instabilities. The effective vertical mixing coefficient, as determined by means of the dye profiles, was found to vary considerably. It falls in the range 0.01.5 sq cm/sec. The persistency of the dye layers alone shows that the mixing can be extremely weak. The results also suggested that the mixing depends upon the density stratification, the vertical current shear, and the fluctuating kinetic energy. A relationship to this effect was suggested based on Lake Ontario and oceanic data. The energy dissipation per unit mass and time was estimated by means of the dye profiles at depths around 30 m. It was found to be of the order of 0.000061 sq cm/sec to the 3rd power. This value is one to two orders of magnitude smaller than values reported from corresponding depths in the ocean. (See also W76-11275) (Sims - ISWS)
W76-11308

DURATION-LIMITED WAVE SPECTRA IN LAKE ONTARIO DURING THE 1972 HURRICANE AGNES,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
P. C. Liu.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 435-444, 1974. 7 fig, 6 ref.

Descriptors: *Waves(Water), *Hurricanes, *Lake Ontario, Winds, Wind velocity, Wind tides, Buoys, On-site investigations, Measurement, Lakes, Energy, Storms, Limnology.
Identifiers: *Hurricane Agnes, Wave spectra, Waverider buoys.

Analyses of hourly wave spectra during the hurricane Agnes, 22-23 June 1972, from two waverider recordings at Oswego-1 and Oswego-2 buoys in Lake Ontario showed that the growth and decay of significant wave heights follow in approximately linear pattern with time during respectively increasing and decreasing wind speed. An initial growth of wave spectra from a relatively calm condition is quite rapid and abrupt and the growth rate is not linear. The development of individual spectral components can be grouped into three spectral ranges: low frequency range where the components are most sensitive to wind, a high frequency range where the components are generally independent of time or wind stress, and a middle frequency range possesses both high and low frequency range properties. (See also W76-11275) (Sims - ISWS)
W76-11309

A NUMERICAL MODEL FOR THERMAL PLUMES AND RIVER DISCHARGES,
Case Western Reserve Univ. Cleveland, Ohio. Dept. of Earth Sciences.
For primary bibliographic entry see Field 5B.
W76-11310

VERTICAL MOTIONS ALONG THE NORTH SHORE OF LAKE SUPERIOR,
Wisconsin Univ., Madison. Marine Studies Center.
R. A. Ragotzkie.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 456-461, 1974. 3 fig, 1 tab, 5 ref.

Descriptors: *Upwelling, *Lake Superior, *On-site investigations, Measurement, Currents(Water), Temperature, Water temperature, Lakes, Winds, Shores, Coasts, Circulation, Water circulation, Movement, Limnology.
Identifiers: *Vertical motions.

A ten-day upwelling episode in deep water along the north shore of Lake Superior was documented by means of continuous temperature records at nine levels and horizontal currents at three levels. Wind observations at the nearest onshore point were also included. Vertical motions in the water column started below the 150 m level and did not extend to near surface levels until the fifth day. Vertical velocities reached 30 m per day during part of the episode. Upwelling occurs once or twice each month during the period of thermal stratification in this region. Due to their magnitude these motions must play a significant role in the vertical transport of nutrients and plankton of the lake and may be an important factor in maximizing the potential productivity of the lake. (See also W76-11275) (Sims-ISWS)
W76-11311

MODELING CHLORIDE DISTRIBUTION IN SAGINAW BAY,
Environmental Protection Agency, Gross Ile, Mich. Gross Ile Lab.
For primary bibliographic entry see Field 5B.
W76-11312

MEAN MONTHLY SURFACE TEMPERATURES OF LAKE ONTARIO FROM APRIL 1972 TO MARCH 1973,
Atmospheric Environment Service, Toronto (Ontario). Lakes and Marine Applications Section.
W. S. Webb.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 471-482, 1974. 13 fig, 1 tab, 13 ref.

Descriptors: *Water temperature, *Remote sensing, *Lake Ontario, Surveys, Temperature, Lakes, Seasonal, Monthly, Aircraft, Instrumentation, Climatology, Measurement, Limnology.
Identifiers: *International Field Year for the Great Lakes, Surface temperature.

From April 1972 through March 1973 inclusive, 47 airborne radiation thermometer surveys of the surface temperature of Lake Ontario were made by the Atmospheric Environment Service. A mean surface temperature was determined for each month as well as maps of spatial variations. Lake surface temperatures were found to be cooler than the corresponding 1966-71 normal values in all but three months. On three occasions (June, July, and October) surface temperatures were about 2 C below the normal. In all months, mean spatial patterns of surface temperatures closely resembled those of the normal. (See also W76-11275) (Sims-ISWS)
W76-11313

SOURCE IDENTIFICATION OF FUEL OIL SPILLS,
Ontario Ministry of the Environment, Rexdale. Lab. Services Branch.
For primary bibliographic entry see Field 5A.
W76-11314

BACTERIA AND PHOSPHORUS AS INDICATORS OF THE EXTENT OF A LARGE SEWAGE SPILL IN LAKE ERIE,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W76-11315

WATER QUALITY MODEL OF THE LOWER FOX RIVER, WISCONSIN,
Environmental Protection Agency, Anchorage, Alaska. Alaska Operations Office.
For primary bibliographic entry see Field 5B.
W76-11316

A SIMULATION MODEL FOR PHOSPHORUS WASTE DISCHARGES IN THE LAKE ERIE BASIN,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W76-11317

CHLORIDE BUILD-UP AND CONTROL IN LAKE ERIE,
State Univ. of New York at Buffalo.
For primary bibliographic entry see Field 5B.
W76-11318

THE EFFECT OF A FOSSIL FUEL POWER PLANT'S COOLING WATER SYSTEM ON THE

WATER QUALITY OF GREEN BAY, WISCONSIN,
Wisconsin Univ., Green Bay. Coll. of Environmental Sciences.
For primary bibliographic entry see Field 5B.
W76-11319

A SIMULATION MODEL FOR LONG-TERM FORECASTING OF WASTE LOADINGS FROM POPULATION, LAND USE, AND ECONOMIC ACTIVITIES IN THE GREAT LAKES BASIN,
Canada Centre for Inland Waters, Burlington (Ontario),
For primary bibliographic entry see Field 5B.
W76-11320

A LIMNOLOGICAL SURVEY OF NEARSHORE WATERS OF LAKE SUPERIOR,
Ontario Ministry of the Environment, Toronto. Water Resources Branch.
J. D. Kinkead, and R. M. Chatterjee.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 549-573, 1974. 14 fig, 4 tab, 16 ref.

Descriptors: *Water quality, *Surveys, *Lake Superior, On-site investigations, Pollutants, Pollutant identification, Dissolved oxygen, Suspended solids, Water temperature, Chlorophyll, Coliforms, Streptococcus, Heavy metals, Chlorides, Nitrogen, Phosphorus, Chemicals, Turbidity, Shores, Harbors, Measurement, Sampling, Limnology.

Up-to-date and accurate information about existing water quality characteristics is necessary for any future planning or management of the Great Lakes environment. Four cruises on the nearshore waters of Lake Superior were carried out during the late summer and fall of 1973 to provide a systematic water quality monitoring of the Ontario shoreline of the lake. This study generated extensive physical, chemical, and bacteriological data on 67 stations along the north shore of the lake from Whitefish Bay to Thunder Bay. In addition to this, intensive water quality studies were undertaken in the following confined areas where industrial and municipal discharges have contributed to impairment: Peninsula Harbour, Jackfish Bay, Nipigon Bay, and Thunder Bay. A comparison was made of water quality in nearshore and harbor areas including an examination of dissolved oxygen, suspended and dissolved solids, conductivity, turbidity, nitrogen, phosphorus, phenols, alkalinity, chloride, sulphate, pH, heavy metals, dissolved silica, water temperature, chlorophyll a, total and fecal coliforms, and fecal streptococci. Extensive bottom sediment studies were incorporated in the survey program to determine the regions of accumulations of heavy metals, nutrients, pesticides, phthalates, and organic matter. Generally, the overall quality of the nearshore waters of Lake Superior is high and the values of important parameters are well within the limits prescribed by the Ontario Ministry of the Environment for all uses. These waters do not appear to have been adversely affected as yet by the urban and industrial development which has caused significant localized impairment. (See also W76-11275) (Sims - ISWS)
W76-11321

AN ECONOMETRIC FORECASTING MODEL FOR THE MAJOR METROPOLITAN AREAS IN THE LAKE ERIE BASIN,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Economics.
For primary bibliographic entry see Field 5B.
W76-11322

COMPOSITION OF THE OLIGOCHAETE FAUNA OF CENTRAL LAKE MICHIGAN,
California Univ., Santa Barbara. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W76-11323

CANNIBALISM BY THE ADULT ALEWIFE (ALOSA PSEUDOGARENGUS) IN SOUTHERN LAKE MICHIGAN,
South Carolina Wildlife and Marine Resources Dept., Charleston. Marine Resources Center.
R. J. Rhodes, D. A. Webb, and T. S. McComish.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 593-595, 1974. 2 tab, 12 ref.

Descriptors: *Fish, *Fish behavior, *Lake Michigan, Fish diets, Larvae, Fish eggs, Fish populations, Surveys, Sampling, Freshwater fish, Lakes, Aquatic life.
Identifiers: *Alewives, *Fish cannibalism.

During fall of 1971 and 1972, adult alewives (Alosa pseudoharengus) fed upon larval alewives (18-32 mm total length) in Indiana waters of Lake Michigan. Fish eggs (probably Alosa) were observed in stomachs of alewives collected in June and July of both years. Cannibalism should be included among the many factors influencing the survival of larval alewives and their subsequent recruitment to adult populations. (See also W76-11275) (Sims - ISWS)
W76-11324

PHOSPHORUS CYCLING AND LUXURY PHOSPHORUS STORAGE BY ALGAE IN THE WATERS OF GREEN BAY,
Wisconsin Univ., Green Bay. Coll. of Environmental Sciences.
For primary bibliographic entry see Field 5C.
W76-11332

VERTICAL DISTRIBUTION PATTERNS OF GOLDEYE, HIODON ALOSOIDES, IN FORT PECK RESERVOIR, MONTANA,
Kaniksu National Forest, Sandpoint, Idaho.
J. L. Cooper.
U S Nat Mar Fish Serv Fish Bull. 71(2); p 473-478, 1973.

Descriptors: *Distribution patterns, *Montana, Reservoirs, Seasonal, Temperature, Water temperature.
Identifiers: *Goldeye, Hiodon-Alosoides, *Vertical distribution patterns, Fort Peck reservoir(Mont).

In Nov. 1967 and continuing into Dec. 1969, the goldeye, H. alosoides (Rafinesque), in Fort Peck Reservoir, Montana, exhibited seasonal vertical distribution patterns, which seemed to be related to the surface-water temperature. When surface-water temperatures were above 8.9C (summer and early fall), the goldeye congregated near the surface. During the late fall, ice-covered period, and spring when surface temperatures varied between 8.9 and 1.1C, the goldeye usually congregated between the 8- and 32-ft level. It is suggested that the goldeye were following the food source and were not responding to temperature per se.--Copyright 1973, Biological Abstracts, Inc.
W76-11333

SOURCES OF WATER QUALITY, LAKE LEVEL, ICE, WATER TEMPERATURE, AND METEOROLOGICAL DATA FOR THE ST. LAWRENCE GREAT LAKES,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
For primary bibliographic entry see Field 7C.
W76-11363

OLIGOTROPHICATION - A SELF-ACCELERATING PROCESS IN LAKES SUBJECTED TO EXCESSIVE SUPPLY OF ACID SUBSTANCES,
Institute for Water and Air Pollution Research, Stockholm (Sweden).
For primary bibliographic entry see Field 5C.
W76-11403

FIELD STUDIES ON THE PHYTOTOXICITY OF CRUDE OIL TO SUBARCTIC AQUATIC VEGETATION,
For primary bibliographic entry see Field 5C.
W76-11405

A NUMERICAL MODEL OF THE TIME-DEPENDENT, THREE-DIMENSIONAL STRUCTURE OF CIRCULATION IN LARGE LAKES,
Geological Survey, Menlo Park, Calif.
R. T. Cheng.
Meeting Preprint 2692 for presentation at American Society of Civil Engineers National Water Resources and Ocean Engineering Convention, held in San Diego, California, April 5-8, 1976. 27 p, 8 fig, 25 ref.

Descriptors: *Model studies, *Numerical analysis, *Water circulation, *Lakes, Winds, Lake morphology, Lake morphometry, Lake shores, Bathymetry.

A mixed analytical and numerical transient circulation model is proposed. A three-dimensional circulation structure can be calculated by solving a system of depth-averaged, two-dimensional conservation equations and by evaluation of the formal solutions. Large-scale movement of water in lakes is considered. Wind stress imposed on the free surface is the primary source of momentum and energy. Due to relatively small size (when compared with the open ocean), the circulation is strongly dependent upon the lake-basin morphology. Thus, accurate representation of the basin's shoreline and bathymetry is essential. (Woodard-USGS)
W76-11422

PROCEEDINGS, SEVENTEENTH CONFERENCE ON GREAT LAKES RESEARCH, PART 2.
Proceedings of a conference held August 12-14, 1974, McMaster University, Hamilton (Ontario). International Association for Great Lakes Research, c/o Robert A. Sweeney, Treasurer, State University College, Buffalo, New York, Great Lakes Laboratory, 1974. 232 p.

Descriptors: *Great Lakes, *Limnology, *Water quality, *Biology, *Lake Ontario, Aquatic life, Water pollution, Sediments, Sands, Water temperature, Model studies, Lakes, Nutrients, Phytoplankton, Bacteria, Biomass, Pollutants, Meteorology, Atmosphere, Optical properties, Winds, Wind tides, Forecasting, Clouds.
Identifiers: *International Field Year for the Great Lakes.

The papers were grouped under the general headings of biology, chemical limnology, geology/geochemistry, meteorology/hydrology, physical limnology, and water quality. A wide variety of research on the Great Lakes was reported. Many of the papers dealt with research related to the International Field Year for the Great Lakes (IFYGL), a North American contribution to the International Hydrologic Decade (IHD). A subject index for both parts of this proceedings was included in this volume. (See W76-11425 thru W76-11442) (Sims-ISWS)
W76-11424

THE ABUNDANCE OF DIATOMS IN THE SOUTHWESTERN NEARSHORE REGION OF

LAKE ONTARIO DURING THE SPRING THERMAL BAR PERIOD,
State Univ. of New York Coll. at Buffalo. Great Lakes Lab.
G. J. Lorefice, and M. Munawar.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 619-628, 1974. 3 fig, 4 tab, 25 ref. EPA 800701.

Descriptors: *Diatoms, *Phytoplankton, *Lake Ontario, Surveys, Sampling, Plankton, Aquatic microorganisms, Temperature, Water temperature, Biomass, Aquatic life, Silica, Nitrogen, Phosphorus, Nutrients, Shores, Lakes, Limnology, Biology.
Identifiers: *Thermal bars.

As part of the IFYGL program an intensive study was carried out during April and May 1972 in the nearshore region of Lake Ontario. Water samples were collected from 45 stations on the southwestern nearshore area of Lake Ontario at 1/2, 4 and 8 kms from the shore. Using the Utermohl technique, phytoplankton was analyzed qualitatively and quantitatively. During the investigation period the thermal bar remained within the study area. In April it stayed shoreward of the 4 kms stations, dipping into and out of the shore. By May it had advanced farther out but in most cases to less than 8 kms. Total phytoplankton biomass along with diatoms, particularly Melosira binderana Kutz. showed high concentrations on the nearshore side of the thermal bar. This observation may be related to temperature and the concentration of nutrients in the nearshore region. Diatoms accounted for 58% of the biomass in April and 48% in May. During April Surirella angustata Kutz., Rhodomonas minuta Skuja and Peridinium aciculiferum (Lemm.) Lemm. were the most common species while M. binderana Kutz., P. aciculiferum, and Melosira islandica ssp. helvetica O. Muller were common in May. (See also W76-11424) (Sims-ISWS)
W76-11425

PHYTOPLANKTON BIOMASS, SPECIES COMPOSITION AND PRIMARY PRODUCTION AT A NEARSHORE AND A MIDLAKE STATION OF LAKE ONTARIO DURING IFYGL,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W76-11426

A PRELIMINARY STUDY ON THE OCCURRENCE AND DISTRIBUTION OF GEOFUNGI IN LAKE ONTARIO NEAR THE NIAGARA RIVER,
Canada Centre for Inland Waters, Burlington (Ontario).
A. A. Qureshi, and B. J. Dutka.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 653-662, 1974. 3 fig, 5 tab, 48 ref.

Descriptors: *Fungi, *Aquatic fungi, *Lake Ontario, Sampling, Surveys, Pollutant identification, Water pollution, Rivers, Lakes, Laboratory tests, Analytical techniques, Coliforms, Streptococcus, Pollutants, Nutrients, Bacterica, Indicators, Limnology, Bioindicators.
Identifiers: *Niagara River(NY), *Geofungi.

The occurrence, distribution and relative abundance of geofungi in water samples, collected from Lake Ontario near the mouth of the Niagara River, were examined to determine their relationship to other water pollution indicator parameters. The results suggested a relationship between geofungi and certain physical, chemical and bacteriological parameters. The significance of the presence of geofungi in aquatic environment and their possible use as water pollution indicator organisms were discussed. (See also W76-11424) (Sims - ISWS)
W76-11427

BACTERIAL POPULATIONS IN LOWER GREEN BAY,
Wisconsin Univ. Green Bay, Coll. of Environmental Sciences.
L. J. Schwartz.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 663-667, 1974. 1 fig, 3 tab, 9 ref.

Descriptors: *Bacteria, *Water pollution, *Bays, *Lake Michigan, Rivers, Lakes, Sampling, Surveys, Coliforms, Streptococcus, Sewage, Sewage effluents, Sewage bacteria, Pollutants, Sewage treatment.
Identifiers: *International Field Year for the Great Lakes, *Green Bay(Wis), *Fox River(Wis).

A study was undertaken to determine bacterial densities in lower Green Bay. Water samples were collected monthly from a relatively fine grid sampling network covering approximately 25 sq km of the lower bay. Standard bacteriological techniques were employed to isolate total and fecal coliform, fecal streptococci, and total bacteria (plate count). Results indicated that the major source of bacterial input into lower Green Bay is via the Fox River. A large contributor to this bacterial load is the effluent discharge of a 20 mgd sewage treatment plant near the mouth of the river. Highest bacterial densities were obtained at the mouth of the river with decreasing densities as the distance increased from the river's mouth. Fecal coliform counts ranged in the hundreds of thousands per 100 ml at some locations. Fecal coliform--fecal streptococci ratios often exceeded four, indicative of human fecal contamination. (See also W76-11424) (Sims - ISWS)
W76-11428

IFYGL STREAM MATERIALS BALANCE STUDY,
Environmental Protection Agency, Rochester, N. Y.
For primary bibliographic entry see Field 5B.
W76-11429

IFYGL CHEMICAL INTERCOMPARISONS,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
A. Robertson, F. C. Elder, and T. T. Davies.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 682-696, 1974. 8 tab, 5 ref.

Descriptors: *Sampling, *Water chemistry, *Analytical techniques, *Great Lakes, Surveys, Chemistry, Laboratory tests, *Chemical analysis, Ships, Lakes, Nutrients, Chemicals, Metals, Turbidity, Analysis, *Pollutant identification, Water pollution, Limnology.
Identifiers: *International Field Year for the Great Lakes.

During the IFYGL program three separate intercomparisons of chemical determinations were conducted. In the first study, samples of known concentration for a number of properties were sent for analysis to several laboratories. Statistical evaluation of the results from these determinations showed that, except for sodium, there was little evidence that the means for the laboratory determinations differed from the comparable known concentrations. However, the results of this study did indicate that, for most of the properties, there were systematic differences among the results from the participants. In the second study, samples were obtained at four depths at each of two stations and each sample was split into four parts. For one of these a number of determinations were conducted immediately on the vessel. The other three subsamples were frozen and sent to three of the major IFYGL laboratories, and the same analyses were conducted as aboard the ship. This procedure was carried out five different times. Analysis of the results showed statistically significant differences among the results from the three laboratories for many of the parameters. In the third study, several of the vessels involved in IFYGL were brought together and similar sampling programs were carried out on each. Series of replicate samples were obtained by each vessel and one of the replicates was analyzed by each of the three participating laboratories. The data for this work indicated that differences in sampling methods among the vessels probably have a relatively minor effect on the results obtained. (See also W76-11424) (Sims - ISWS)
W76-11430

HEAVY MINERALS IN THE SANDS OF SOUTHERN AND EASTERN LAKE ONTARIO,
Rochester Univ. N. Y. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2J.
W76-11431

CLOUD ANALYSIS AND DIAGNOSIS OVER LAKE ONTARIO AND VICINITY,
Center for the Environment and Man, Inc. Hartford, Conn.
J. T. Ball.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 704-712, 1974. 7 tab, 5 ref. NOAA 2-35353

Descriptors: *Clouds, *Lake Ontario, *Forecasting, Correlation analysis, Temperature, Air temperature, Humidity, Atmosphere, Solar radiation, Lakes, Seasonal, Meteorology.
Identifiers: *International Field Year for the Great Lakes, Middle clouds, High clouds.

The computation of the radiation budget of Lake Ontario requires a reasonably accurate analysis of the horizontal and vertical distribution of cloudiness. Results have shown that radiative fluxes computed at the surface are highly sensitive to cloud amount. Objective analyses of low, middle, and high cloud amount were obtained at three-hourly intervals during the period April 1972 through March 1973. Possible lake effects on low cloud amount were investigated during the July 1972 to November 1972 period, and statistical relationships were derived. Serious errors can be introduced into solar radiation computations during periods of persistent, extensive, low cloud overcast due to errors in estimating the amount of middle and high clouds. During the IFYGL, observations of middle and high cloud amount were completely lacking about 10% of the time. To alleviate this problem, a study was conducted to develop diagnostic procedures to estimate middle and high cloud amount above a low overcast. Multiple linear regression equations were developed relating middle and high cloud amount to predictors derived from Buffalo radiosonde observations taken on OOGMT and 12GMT. The predictors were mainly temperature and moisture dependent variables between the 850- and 400-mb constant pressure surfaces. Equations were developed for the entire sample of 597 cases and for seasonal stratifications of the sample. The diagnostic results obtained were shown to be superior to assuming conditions of clear, overcast or climatological averages for upper-level cloud amounts. (See also W76-11424) (Sims - ISWS)
W76-11432

PRELIMINARY ENERGY BUDGET OF LAKE ONTARIO FOR THE PERIOD MAY THROUGH NOVEMBER, 1972,
Canada Centre for Inland Waters, Burlington (Ontario).
F. C. Elder, F. M. Boyce, and J. A. Davies.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 713-724, 1974. 8 fig, 2 tab, 15 ref.

Descriptors: *Energy budget, *Thermal radiation, *Lake Ontario, Solar radiation, Temperature, Water temperature, Evaporation, Radiation, Albedo, Heat transfer, Heat budget, Heat balance, Lakes, Energy, Heat, Latent heat, Limnology.
Identifiers: *International Field Year for the Great Lakes.

Measurements were made during the International Field Year for the Great Lakes which permit calculation of the thermal energy budget for Lake Ontario for the April to December period. A network of meteorological measurement stations provided data from which latent and sensible heat flux were calculated. Global solar and long-wave radiation measurements allowed assessment of the net radiation balance. Approximate bi-weekly intensive temperature surveys provided for independent computation of the lake heat storage. Over the period for which measurements were available, the measured heat storage exceeded the value calculated from the energy budget by over 8000 cal/sq cm. This amounts to difference of 33 cal/sq cm/day or approximately 5% of the maximum daily flux. Analysis of the possible error in each of the budget terms indicated that the net radiation calculations are most likely the largest contributor. The incoming long-wave radiation estimates are least subject to verification and are believed to contain the greatest degree of uncertainty. (See also W76-11424) (Sims - ISWS)
W76-11433

GREAT LAKES WIND FORECASTS BASED ON MODEL OUTPUT STATISTICS,
National Weather Service, Silver Spring, Md. Techniques Development Lab.
D. M. Feit, and C. S. Barrientos.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 725-732, 1974. 4 fig, 4 ref.

Descriptors: *Winds, *Forecasting, *Great Lakes, Computer models, Mathematical models, Computer programs, Stability, Temperature, Boundary layers, Atmosphere, Lakes, Meteorology.
Identifiers: *Wind forecasting, Forecasting models.

An automated objective method to forecast the maximum steady winds at twelve locations over the five Great Lakes has been developed for routine use by the National Weather Service. The developmental approach is statistical in nature and is based on the Model Output Statistics (MOS) technique. This technique matches the output from a numerical model (predictors) with observations (predictands) and computes a prediction equation. The predictors are various forecast elements computed by the National Meteorological Center's Primitive Equation (PE) model. The predictands are wind observations taken by vessels operating on the Great Lakes. A multiple regression screening program was used to derive the prediction equations. Multiple correlation coefficients of .83 to .40 were obtained between predictors and predictands. Separate sets of equations were derived for each of six forecast periods out to 36 hours. For each period, a set of three equations was derived consisting of U- and V-components and wind speed equation. Distinct sets of equations were developed for the summer and winter seasons and for the 0000 GMT and 1200 GMT PE model origin times. User stations have indicated that the forecasts are useful and synoptically reasonable. (See also W76-11424) (Sims - ISWS)
W76-11434

OBJECTIVE ANALYSIS OF IFYGL SURFACE METEOROLOGICAL DATA,
National Oceanic and Atmospheric Administration, Washington, D. C.
J. B. Jalickee, J. K. S. Ching, and J. A. Almazan.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 733-750, 1974. 17 fig, 12 ref.

Descriptors: *Data processing, *Meteorological data, *Lake Ontario, Computer programs, Analytical techniques, Air temperature, Water temperature, Winds, Humidity, Weather, Mathematics, Mathematical models, Lakes, Meteorology.
Identifiers: *International Field Year for the Great Lakes, Objective analytical techniques.

An objective analysis scheme has been developed for the analysis of IFYGL data. Observed values of a given meteorological field were fitted to a model consisting of polynomials in the space-time variables in the sense of generalized least squares. Orthogonal polynomials, formed accurately from base polynomials by a Gram-Schmidt reorthogonalization procedure, were used to effect the least-squares fit. Meteorological data from the Canadian buoys and the U. S. buoys and towers were analyzed for two time periods by means of the objective analysis technique. The two periods chosen were 7 to 21 July and 1 to 10 October 1972. The former was characterized by near-neutral atmospheric conditions, the latter by unstable conditions. Objective analyses were done of air temperature, surface temperature, wind, and humidity in order to obtain area averages for Lake Ontario. Similarly, area averages were computed of estimates of momentum, heat, and water-vapor surface fluxes derived by the bulk aerodynamic method. Fields of the lateral and longitudinal wind components and of vorticity and divergence were presented. The results of these analyses were evaluated with respect to synoptic conditions and were also compared with results obtained by the station-averaging method. (See also W76-11424) (Sims - ISWS)
W76-11435

THE ATMOSPHERIC BUDGETS PROGRAM OF IFYGL,
National Oceanic and Atmospheric Administration, Washington, D. C. Environmental Data Service.
E. M. Rasmusson, H. L. Ferguson, J. Sullivan, and J. den Hartog.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 751-777, 1974. 18 fig, 5 tab, 25 ref.

Descriptors: *Heat budget, *Water vapor, *Lake Ontario, Atmosphere, Analytical techniques, Lakes, Evaporation, Winds, Air temperature, Humidity, Data processing, Heat transfer, Weather, Weather data, Meteorological data, Limnology, Meteorology.
Identifiers: *International Field Year for the Great Lakes, *Atmospheric budgets, Objective analytical techniques.

The water vapor and heat budgets of the atmosphere over Lake Ontario was evaluated to obtain estimates of average lake evaporation for periods on the order of a week. Data for this project were obtained during September-December 1972 from a six-station network of LORAN-C rawinsonde stations located along the perimeter of the lake. The design of the experiment and results of the field program were reviewed. Unexpected errors in the LORAN-C time delay data required a significant sacrifice of vertical resolution in the processed wind data. However, the relatively high time and vertical resolution of the temperature and humidity data revealed the detailed structure of these fields to a degree not attainable with routine operational data. A set of conservation equations, suitable for budget analyses over Lake Ontario, was derived. Special attention was given to the possibility of phase change between liquid, solid, and vapor states, and problems arising when the flux of condensed moisture across the shoreline is significant. A budget analysis scheme was discussed in which the meteorological fields are represented in terms of a set of orthoganal functions in time and space. Examples of fitted wind and humidity fields were presented. (See also W76-11424) (Sims - ISWS)
W76-11436

DETERMINATION OF THE AERODYNAMIC DRAG COEFFICIENT FROM WIND SET-UP,
Canada Centre for Inland Waters, Burlington (Ontario).
M. A. Donelan, F. C. Elder, and P. F. Hamblin.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 778-788, 1974. 5 fig, 1 tab, 20 ref.

Descriptors: *Wind tides, *Drag, *Lake Ontario, Winds, Stress, Stability, Atmospheric pressure, Water levels, Lakes, Currents(Water), Water temperature, Seiches, Rotations, Tides, Waves(Water), Wave pile-up, Fluid mechanics, Limnology.
Identifiers: *International Field Year for the Great Lakes.

The estimation of wind stress from the steady state water set-up of an enclosed water body is fraught with uncertainties arising primarily from measurement errors of the overall wind field and the water level in the presence of shoaling waves. During the IFYGL there were several accurate water level recording gages installed around Lake Ontario, and the wind field was monitored continuously at a score of stations across the Lake. In addition, a 'deep water' gage was installed off Niagara-on-the-Lake. This gage was compared with nearby gages in shallower water to assess the effect of wave set-up on the water level measurement in shallower water. This was concluded that the difference in water level between Burlington and Oswego is probably accurate for eastward surface stress. The effects of atmospheric pressure, tides and seiches were removed and the error due to bottom stress was shown to be small. Finally the corrected and filtered water levels were correlated with the lake-wide average stress and drag coefficient deduced for unstable and neutral atmospheric boundary layers. The drag coefficient obtained from the data points without regard to stability was 0.00135; that for neutral conditions was smaller, and unstable conditions larger. (See also W76-11424) (Sims - ISWS)
W76-11437

SHORT PERIOD TIDES IN LAKE ONTARIO,
Canada Centre for Inland Waters, Burlington (Ontario).
P. F. Hamblin.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 789-800, 1974. 8 fig, 3 tab, 12 ref.

Descriptors: *Tides, *Lakes, *Lake Ontario, Circulation, Water circulation, Model studies, Mathematical models, Equations, Diurnal, Water levels, Hydrodynamics, On-site investigations, Limnology.
Identifiers: *International Field Year for the Great Lakes.

The diurnal and semidiurnal tides of Lake Ontario were simulated numerically by means of a numerical hydrodynamical model in which only the spacial derivatives are discretized. The semianalytical model predicted a direct response for both tidal constituents, that is, in the direction of rotation of the tidal generating force. The sense of rotation was cum sole for the semidiurnal oscillation and in the opposite sense for the diurnal tide. Maximum predicted amplitudes of 12.1 mm occurred at the western extremity of the lake for the semidiurnal tide and 5.2 mm at the same location for the diurnal tide. The main feature of the predicted response, that the semidiurnal tide rotates in a clockwise direction was corroborated by the observations at 16 tidal gages around the lake. An amphidromic point in both the model and prototype was located at a mid-lake position to the north of Rochester. The tidal solutions were relatively insensitive to bottom friction which does not reasonably account for the fact that the observed amplitudes are 70% of the theoretical amplitudes. This discrepancy was well explained by the effect of the earth tide and was in close agreement with measurements of the earth tide found in the literature. (See also W76-11424) (Sims - ISWS)
W76-11438

TRANSIENT THERMAL RESPONSE OF LARGE LAKES TO ATMOSPHERIC DISTURBANCES,
Hydronautics Inc., Laurel Md.
T. R. Sundaram.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 801-810, 1974. 4 fig, 19 ref.

Descriptors: *Thermal properties, *Thermocline, *Model studies, *Lakes, Thermal stratification, Seasonal, Temperature, Water temperature, Mixing, Heat, Winds, Energy, Mathematical models, Laboratory tests, On-site investigations, Limnology.
Identifiers: *Thermal bar.

A length scale which is a measure of the relative magnitudes of the fluxes of thermal and wind-induced mixing energies at the surface of a lake was used to describe the transient thermal response of a lake to changes in atmospheric condition above it. This length scale was used previously to describe the seasonal stratification cycle. Two specific transient phenomena were considered here as examples, namely, thermocline erosion due to a sudden storm and the thermal bar. The rate of downward erosion of the thermocline due to a storm was calculated in terms of the wind conditions and the results are compared with those of existing laboratory experiments. A theoretical model was also developed for the formation, evolution and ultimate disappearance of the thermal bar. The results were again compared with available laboratory and field data. (See also W76-11424) (Sims - ISWS)
W76-11439

OPTICAL PROPERTIES OF THE GREAT LAKES,
Canada Centre for Inland Waters, Burlington (Ontario).
K. P. B. Thomson, J. Jerome, and W. R. McNeil.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 811-822, 1974. 12 fig, 1 tab, 8 ref.

Descriptors: *Optical properties, *Lake Ontario, *Great Lakes, *Lake Superior, *Lake Erie, On-site investigations, Model studies, Statistical models, Light, Solar radiation, Turbidity , Water properties, Physical properties, Analytical techniques, Lakes, Chlorophyll, Limnology.
Identifiers: *Optical transmittance, Organic particles.

During the IFYGL, a series of in situ optical measurements were carried out as part of the Lake Ontario Organic Particle Study. The principal optical measurement made during each cruise was the downwelling irradiance of sunlight, from 400-700 nm, as a function of depth. These data were used to investigate the optical characteristics of Lake Ontario in terms of the spectral transmittance of the downwelling irradiance. Similar measurements from Lake Erie and Lake Superior were analyzed and compared with the Lake Ontario data. The analysis and intercomparison of the data for the three Great Lakes was based on Vollenweider's statistical model of the extinction coefficient. Significant deviations from Vollenweider's standard distribution could be identified as differences in the optical characteristics of a lake resulting from the limnological properties of the particular water body. Comparison of the extinction and the linear regression coefficients obtained from the Great Lakes to the standard distribution showed significant deviations in the blue (430 nm) and red (630 nm) regions of the spectrum. These differences were interpreted to mean that the Laurentian Great Lakes contain appreciable amount of humic substances; this was substantiated by laboratory absorption measurements on filtered samples. The data also showed that the seasonal variations of the mean vertical extinction coefficient delineate clearly the physical and biological changes in the lakes. The mean vertical extinction coefficient can be used as a gross indicator of the general optical state of the lake. (See also W76-11424) (Sims - ISWS)
W76-11440

PHOSPHATE, ALGAE, AND TACONITE TAILINGS IN THE WESTERN ARM OF LAKE SUPERIOR,
Texas Univ. at Dallas. Richardson. Inst. for Environmental Sciences.
For primary bibliographic entry see Field 5C.
W76-11441

A MODEL FOR THE STUDY OF EPISODES IN THE DISPERSION OF A CONSERVATIVE POLLUTANT IN LAKE MICHIGAN,
Illinois Univ., at Chicago Circle, Chicago. Dept. of Information Engineering.
For primary bibliographic entry see Field 5B.
W76-11442

PARTICULATE RESIDENCE TIMES,
Atmospheric Environment Service, Toronto (Ontario).
For primary bibliographic entry see Field 5A.
W76-11450

HYPOLIMNION OXYGENATION,
Union Carbide Corp., New York. (Assignee).
For primary bibliographic entry see Field 5G.
W76-11454

POPULATION DYNAMICS AND PRODUCTION OF DAPHNIA HYALINA IN A EUTROPHIC RESERVOIR,
Freshwater Biological Association, Wareham (England). Windermere Lab.
For primary bibliographic entry see Field 5C.
W76-11457

HYDRAULIC MODEL STUDIES OF MECHANICAL MIXING DEVICES IN STRATIFIED LAKES,
Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.
For primary bibliographic entry see Field 8B.
W76-11495

INVERTEBRATE FAUNA OF THE LAKES OF THE LOWER TAREYA RIVER (WESTERN TAIMYR), (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Invertebrate Zoology.
For primary bibliographic entry see Field 5C.
W76-11537

BACTERIAL POPULATIONS IN SKADAR LAKE, (IN SERBO-CROATIAN),
Zavod Za Biologiju Mora, Kotor (Yugoslavia).
For primary bibliographic entry see Field 5C.
W76-11538

INCREASE OF PRIMARY PRODUCTION IN A BAY OF MALYI ZHEMCHUZHNYI ISLAND (NORTH CASPIAN) USING INORGANIC FERTILIZERS, (IN RUSSIAN),
Kaspiiskii Nauchno-Iseledovatelskii Institut Rynogo Khozyaistva, Astrakhan (USSR).
For primary bibliographic entry see Field 5C.
W76-11553

FEATURES OF FRESHWATER ECOSYSTEMS (FROM THE RESULTS OF SOVIET PARTICIPATION IN THE INTERNATIONAL BIOLOGICAL PROGRAM), (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institit.
For primary bibliographic entry see Field 5C.
W76-11556

PHYSICO-CHEMICAL PARAMETERS OF THE HYDROGRAPHIC SYSTEM OF LAKE NANTUA: RELATION WITH OSCILLATORIA, (IN FRENCH),
Station d'Hydrobiologie Continentale, Thonon-les-Bains (France).
For primary bibliographic entry see Field 5C.
W76-11575

THE EFFECTS OF NTA ON THE GROWTH OF PHYTOPLANKTON WITH PARTICULAR CONSIDERATION GIVEN TO IRON AS A MICROELEMENT,
Eidgenoessische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewaesserschutz, Zurich (Switzerland).
For primary bibliographic entry see Field 5C.
W76-11578

EFFECT OF TREATED SEWAGE EFFLUENTS ON PHYTOPLANKTON IN LAKES, (IN GERMAN),
Eidgenoessische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewaesserschutz, Zurich (Switzerland).
For primary bibliographic entry see Field 5C.
W76-11579

BIOLOGICAL-PRODUCTIVE INVESTIGATIONS OF ZOOPLANKTON IN THE LAKES AND WATER RESERVOIRS OF THE USSR (GENERAL RESULTS OF THE INTERNATIONAL BIOLOGICAL PROGRAM), (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheski Institut.
M. B. Ivanova.

Descriptors: *Zooplankton, *Lakes, *Reservoirs, Productivity, Biology, Phytoplankton, Predation.
Identifiers: *International Biological Program(USSR).

A brief summary of investigations bearing on the biological productivity of zooplankton in reservoirs located in various geographical zones is presented. A general decrease in species diversity and quantity from the S towards the N was observed. Data regarding the production of separate

trophic levels of the herbivorous zooplankton and predators of the 1st order are given. Production depends on the biomass of the animals forming a given trophic level and the duration of the growing season. The ratio of the production of herbivorous zooplankton to the primary production of the phytoplankton varies from 2.2-20.7%. The humus-containing reservoirs this value is considerably higher--30%. The production of the predatory zooplankton is an average 19.1% of that of the herbivorous zooplankton.--Copyright 1976, Biological Abstracts, Inc.
W76-11581

A COMPARISON OF THE ABUNDANCE AND DIVERSITY OF FOSSIL PIGMENTS IN WETLAND PEATS AND WOODLAND HUMUS LAYERS,
Ohio Wesleyan Univ., Delaware. Dept. of Botany and Bacteriology.
For primary bibliographic entry see Field 5C.
W76-11601

OBSERVATIONS ON THE CESTODE EUBOTHRIUM SALVELINI IN JUVENILE SOCKEYE SALMON (ONCORHYNCHUS NERKA) AT BABINE LAKE, BRITISH COLUMBIA,
Fisheries and Marine Service, Nanaimo (British Columbia). Biological Station.
For primary bibliographic entry see Field 5C.
W76-11624

2I. Water In Plants

EFFECTS OF WATER STRESS UNDER CONTRASTING ENVIRONMENTAL CONDITIONS ON TRANSPIRATION AND PHOTOSYNTHESIS IN SOYBEAN,
Department of Scientific and Industrial Research, Palmerston North (New Zealand) Plant Physiology Div.
For primary bibliographic entry see Field 3F.
W76-11362

TRANSPIRATION AND PHOTOSYNTHESIS IN SOYBEAN: EFFECTS OF TEMPERATURE AND VAPOUR PRESSURE DEFICIT,
Department of Scientific and Industrial Research, Palmerston North (New Zealand) Plant Physiology Div.
For primary bibliographic entry see Field 3F.
W76-11407

FOOD AND GROWTH PARAMETERS OF JUVENILE CHINOOK SALMON, ONCORHYNCHUS TSHAWYTSCHA, IN CENTRAL COLUMBIA RIVER,
Battelle-Pacific Northwest Labs., Richland, Wash. Ecosystems Dept.
C. D. Becker.
U S Nat Mar Fish Serv Fish Bull. 71(2), p 387-400, 1973.

Descriptors: *Chinook salmon, *Columbia River, Washington, *Diptera, *Fish diets, *Fish growth, Aquatic insects, Juveniles.
Identifiers: Collembola, Notonectidae, Oncorhynchus-Tshawytscha, Trichoptera.

Juvenile chinook salmon, 0. tshawytscha, in the Hanford area of the free-flowing central Columbia River, Washington consume almost entirely adult and larval stages of aquatic insects. Their diet is dominated by midges (Diptera:Chironomidae). By numbers, adult midges provided 64 and 58% of the diet and larval midges 17 and 18% of the diet, in 1968 and 1969, respectively. The families Hydropsychidae (Trichoptera or caddisflies), Notonectidae (Hemiptera or true bugs), and Hypogastruridae (Collembola or springtails) are of minor numerical importance with a combined utilization of 7% in 1968 and 15% in 1969. Distinctive features of food and feeding activity of juvenile chinook salmon at Hanford are 4-fold: the fish utilize relatively few insect groups, predominantly Chironomidae; they depend largely upon autochthonous river organisms; they select prey drifting, floating, or swimming in the water; and they are apparently habitat opportunists to a large extent. Analysis were made of variation in diet and numbers of insects consumed between 6 sampling stations distributed along a 38-km section of the river. Data are provided on feeding intensity, fish lengths, length-weight relationships, and coefficients of condition. Seasonal changes in river temperature and discharge, as well as variations in regulated flow levels, are environmental features influencing feeding, growth, and emigration of fish in the Hanford environs.--Copyright 1973, Biological Abstracts, Inc.
W76-11411

THE TILTED FOREST: GLACIOLOGICAL-GEOLOGIC IMPLICATIONS OF VEGETATED NEOGLACIAL ICE AT LITUYA BAY, ALASKA,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 2C.
W76-11423

SOIL WATER UPTAKE BY ALFALFA,
Agricultural Research Service, Kimberly, Idaho, Snake River Conservation Research Center.
For primary bibliographic entry see Field 3F.
W76-11504

DROUGHT RESISTANCE CHARACTERISTICS OF BLUE GRAMA SEEDLINGS,
Agricultural Research Service, Fort Collins, Colo.
A. M. Wilson, D. N. Hyder, and D. D. Briske.
Agronomy Journal, Vol. 68, No. 3, p 479-484, May-June 1976. 5 fig, 3 tab, 11 ref.

Descriptors: *Drought resistance, *Planting management, *Grama grasses, *Root development, *Plant growth, Plant morphology, Xylem, Stomata, Evaporation, Transpiration, Moisture uptake, Greenhouses, Leaves, Environmental control.
Identifiers: *Blue grama seedling, Bouteloua gracilis.

Blue grama (Bouteloua gracilis) seedling drought resistance was studied in relation to stages of shoot and root development. Seedlings restricted to the seminal root or one or two adventitious roots were grown in moist soil of a controlled environment chamber, in a greenhouse and in the field; shoot environment drought was measured by the evaporation rate from a standard pan. Growth drought resistance, which was defined as shoot environment drought sufficient to stop seedling leaf area expansion, was directly related to the critical evaporation/transpiration ratio for seedling growth and to the maximum root water uptake rate. Drought resistance was also inversely proportional to seedling leaf area. In an environment with a constant evaporation rate, leaf area increased to the water supply limit when evaporation from a free water surface was six times greater than transpiration. The amount of vascular tissue in the blue grama root does not increase as the seedling grows. Thus, when a dry surface soil prevents adventitious root formation the size and number of xylem vessels in the seminal root and subcoleoptile internode impose a limit on the volume of water that can be transported to the shoot. (Jahns-Arizona)
W76-11505

NITROGEN-SILICON INTERACTION IN PLANTS GROWN IN DESERT SOIL WITH NITROGEN DEFICIENCY,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
For primary bibliographic entry see Field 3F.
W76-11509

CARISSA DIEBACK: ETIOLOGY SUGGESTS CONTROL,
Agricultural Research Center, Fort Lauderdale, Fla.
R. E. McCoy.
Proc Fla State Hortic Soc. 85, p 363-364, 1972.

Descriptors: *Root systems, *Saturated soils, *Fungi, *Fungicides.
Identifiers: Benomyl, *Carissa-Grandiflora, Dieback, Etiology, Phytophthora-Sp, Rhizoctonia-Solani, Terrazole, *Root rot.

Defoliation and dieback of stems of potgrown Carissa grandiflora cv. 'Boxwood Beauty' and 'Bonsai' were found associated with waterlogged soil and severe root rot. Rhizoctonia solani and Phytophthora sp. were consistently isolated from rotting Carissa roots. Both fungi were root rotters; but benomyl, which controlled Rhizoctonia root rot, was ineffective against Phytophthora. Phytophthora was adequately controlled by terrazole, which in turn, was ineffective against Rhizoctonia. The existence of such disease complex may help explain the inability of either of these compounds to provide control of Carissa dieback in field tests.--Copyright 1974, Biological Abstracts, Inc.
W76-11513

NITROGEN FLUX INTO CORN ROOTS AS INFLUENCED BY SHOOT REQUIREMENT,
Agricultural Research Service, Byron, Ga.
For primary bibliographic entry see Field 3F.
W76-11519

FOOD HABITS OF YEARLING AND ADULT STRIPED BASS, MORONE SAXATILIS (WALBAUM), FROM ALBEMARLE SOUND, NORTH CAROLINA,
National Marine Fisheries Service, Beaufort, N. C. Atlantic Estuarine Fisheries Center.
C. S. Manooch, III.
Chesapeake Sci. 14(2), p 73-86, 1973.

Descriptors: *Bass, *Fish diets, *North Carolina, *Sounds, Amphipoda, Shrimp, Herring, Crabs, *Fish food organisms.
Identifiers: Alosa-aestivalis, Anchoa-mitchilli, Brevoortia-tyrannus, Callinectes-sapidus, Gammarid, Morone-saxatils, Penaeid, *Albermarle Sound(NC), Striped bass.

A total of 1094 yearling and adult striped bass, M. saxatilis, were collected from Albemarle Sound, North Carolina from July 1970 through August 1971. Specimens were captured by gill nets, hook and line, trawl, pound nets, and purse seine, and ranged in size from 125-714 mm total length. Approximately 77% of the fish contained food consisting of 3249 individual organism. Of 25 specific groups of food organisms identified, 15 were species of fish and 10 were taxa of invertebrates. Fish were the main foods of striped bass and occurred in 93% of the stomachs containing food. Predominant species identified were Atlantic menhaden, Brevoortia tyrannus, blueback herring, Alosa aestivalis, and bay anchovy, Anchoa mitchilli. Invertebrates were of secondary importance and consisted mainly of blue crabs, Callinectes sapidus, penaeid shrimp, and gammarid amphipods. Food habits varied substantially with size of fish, area, and season of collection. Cannibalism was rarely encountered. Only 2 yearling striped bass from over 200 examined (1%) contained young M. saxatilis. No striped bass were found in larger specimens. Striped bass are capable of consuming clupeids which are approximately 60% of striped bass length. Small bass generally fed on smaller fish which averaged 20% of the predator's length. Size availability of forage is an important factor in Albemarle Sound. Striped bass preferred the soft-rayed species which generally occurred as juveniles in the sound.--Copyright 1973, Biological Abstracts, Inc.
W76-11522

2J. Erosion and Sedimentation

PHOSPHORUS MOBILITY IN LAKE ONTARIO SEDIMENTS,
Wisconsin Univ., Madison. Water Chemistry Lab.
For primary bibliographic entry see Field 5B.
W76-11288

THE STRATIGRAPHY OF NORTHERN LAKE SUPERIOR LATE-GLACIAL AND POSTGLACIAL SEDIMENTS.
Canada Centre for Inland Waters, Burlington (Ontario),
C. I. Dell.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 179-192, 1974. 10 fig, 16 ref.

Descriptors: *Lake sediments, *Stratigraphy, *Sedimentation, *Lake Superior, Lakes, Sediments, Glacial sediments, Pleistocene epoch, Geologic history, Geology, Clays, Till, Cores, Onsite investigations, Unconsolidated sediments, Sedimentology.
Identifiers: *Post-glacial sediments, *Northern Lake Superior.

This study described the stratigraphy of unconsolidated sediments in Lake Superior north of latitude 48 deg. The study area consisted of three major offshore topographic basins in addition to several shallow shoal and shelf areas. The basins contain lacustrine sediments with a maximum thickness of about 20 m. Postglacial fine-grained sediments consisting primarily of noncalcareous dark gray silty clays range in thickness up to a maximum of 9 m. They overlie glaciolacustrine sediments with a maximum thickness of about 15 m. The dominant glaciolacustrine sediments are gray calcareous varved clays commonly separated from the underlying till by a thin sequence of silty clays or sands. Reddish brown sandy calcareous till underlies much of northern Lake Superior with a gray clayey calcareous till present only in northeastern part. The tills and glaciolacustrine sediments are exposed on the lake floor most commonly in shallower water on the fringes of the topographic basins and on shoals within the basins. In these areas they may be undergoing erosion with transport and redeposition of the sediment in deeper water. The postglacial fine-grained sediments are generally found only in the basins where their accumulation appears to be related not only to water depth but also to local topography. (See also W76-11275) (Sims - ISWS)
W76-11289

GROYNE STABILIZATION OF SLOPE MOVEMENTS AND TOE EROSION, LAKE HURON NEAR BAYFIELD, ONTARIO,
University of Western Ontario, London. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W76-11290

BIOLOGICAL TRANSFORMATION OF CLAY-SIZED SEDIMENTS IN SIMULATED AQUATIC ENVIRONMENTS,
Guelph Univ. (Ontario), Dept. of Land Resource Science.
G. J. Wall, L. P. Wilding, and R. H. Miller.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 207-211, 1974. 4 fig, 14 ref.

Descriptors: *Sediments, *Clays, *Sewage, *Biological properties, Laboratory tests, Lakes, Biodegradation, Microbial degradation, Anaerobic digestion, Cations, Microorganisms, Biological communities, Soils, Sedimentation, Limnology, Lake sediments.

A laboratory study was initiated to investigate the potential for biologically induced transformations of clay-sized sediments under simulated slack and flowing water conditions of the natural freshwater environment. Soil clay materials (less than 2 micrometers) representing surface, subsurface and geologic materials were equilibrated with distilled water and sewage effluents in both static and dynamic environments for periods up to two months. The following analyses were conducted weekly: enumeration of microorganisms, reaction (pH), potassium, silicon, aluminum, electrical conductivity and clay mineralogy. The results of this study indicated that in dynamic systems of clay-sewage and clay-water suspensions, the transformation of the clay material was minimal and within errors of determination. The static systems of clay-sewage, particularly with clay materials from the geologic substratum showed consistent time trends in the parameters measured. The following time trends were observed: an increasing microbial population; slightly increased pH; decreased mica, expandables, and vermiculite; increased quartz and chlorite; increased silica in solution; and decreased potassium in solution. These combined data suggested that the clay-sized sediment had been altered. It was concluded that the environment found most conductive to sediment alteration was one with a high microbial population, a carbonate substrate, and static water (anaerobic) conditions. (See also W76-11275) (Sims - ISWS)
W76-11291

STUDIES OF PLUTONIUM CYCLING AND SEDIMENTATION IN LAKE MICHIGAN,
Argonne National Lab., Ill. Radiological and Environmental Research Div.
For primary bibliographic entry see Field 5B.
W76-11292

OCCURRENCE OF AS, CD, CO, CR, CU, FE, HG, NI, SB, AND ZN IN LAKE ERIE SEDIMENTS,
Bowling Green State Univ., Ohio. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W76-11293

POLLUTANT MERCURY AND SEDIMENTATION IN THE WESTERN BASIN OF LAKE ERIE,
Bowling Green State Univ., Ohio. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W76-11294

STREAM SEDIMENT COMPOSITION: AN AID TO WATER QUALITY ASSESSMENT,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group.
For primary bibliographic entry see Field 5A.
W76-11367

HEAVY MINERALS IN THE SANDS OF SOUTHERN AND EASTERN LAKE ONTARIO,
Rochester Univ. N. Y. Dept. of Geological Sciences.
B. W. Selleck.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 697-703, 1974. 5 fig, 1 tab, 16 ref.

Descriptors: *Sands, *Mineralogy, *Lake Ontario, Sediments, Sedimentology, Beaches, Lakes, Shores, Sampling, Surveys, Rocks, Erosion, Sedimentation.
Identifiers: *Sand sources, Magnetic heavy minerals, Monoclinic pyroxene, Hypersthene, Garnets.

The magnetic heavy mineral fraction of samples of sand-size sediment from the beaches and offshore sand bodies of southern and eastern Lake Ontario has been analyzed to determine variability in the mineral assemblage resulting from longshore transport and associated sedimentary processes. In the samples examined, the ratio of monoclinic pyroxene to hypersthene progressively decreased from west to east along the southern shore. This variation is produced by the dilution of a monoclinic pyroxene-rich suite by a hypersthene-rich suite during easterly transport of sand. The monoclinic pyroxene-rich suite is derived, at least in part, form the large subaqueous sand body offshore of the Niagara River mouth in Lake Ontario. The hypersthene-rich suite is derived from the erosion of shoreline and subaqueous tills along the western New York shore. Other significant variations noted were: (1) relative enrichment of hornblende in lake sands, compared with beach sands; (2) magnetically susceptible rock fragments are most abundant in the separate of samples from the Mexico Bay-Stony Point sands; and (3) the ratio of purple-colorless to red-orange garnet is higher in lake sands than in beach sands. (See also W76-11424) (Sims - ISWS)
W76-11431

FALLOUT 137CS IN THE SOILS AND SEDIMENTS OF THREE SMALL WATERSHEDS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 5B.
W76-11453

SCOUR AND FILL PATTERNS IN POOL-RAPID RIVERS,
Arizona Univ., Tucson. Dept. of Civil Engineering and Engineering Mechanics.
E. Silverston.
Master of Science Thesis, 1975. 85 p, 36 fig, 1 tab, 7 ref, 1 append.

Descriptors: *Scour, *River flow, *River systems, *Deposition(Sediments), *River forecasting, River beds, Open channel flow, Colorado River, Model studies, Flow rates, Equilibrium, Hydrograph analysis.
Identifiers: *Pool-rapid rivers.

Analyzes are presented of scour and fill patterns of a pool-rapid river and how these vary with sediment supply, river width, slope and depth, sediment sizes, downstream rapids, changes in flow rate and bed roughness. The analysis predicts patterns for an imaginary model of a portion of a river with characteristics like those of the Colorado. Results verified that a change in flow indicates pool bed fluctuation by scouring or filling and that the time period until equilibrium varies by several orders of magnitude. With an increase in flow the equilibrium depth increases faster than the head on the control; therefore, pools scour if the flood continues long enough. Fill can be expected along the bed as the flow decreases. A downstream pool following several other pools will scour and fill many times before scouring to equilibrium, since a pool cannot reach equilibrium until all those upstream have. Scour holes and fill mounds remain in the system if the hydrograph time period is less than the time necessary for equilibrium to occur. The pool-rapid river is compared with less complex systems to define its special characteristics. (Jahns-Arizona)
W76-11511

SEDIMENT YIELD AS RELATED TO A STOCHASTIC MODEL OF EPHERMERAL RUNOFF,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
K. G. Renard, and L. J. Lane.
In: Present and Prospective Technology for Predicting Sediment Yield and Sources, Proceedings of the Sediment Yield Workshop, November 28-

30, 1972, U.S. Department of Agriculture Laboratory, Oxford, Mississippi, p 253-263. 10 fig, 3 tab, 24 ref.

Descriptors: *Sediment yield, *Mathematical models, *Ephemeral streams, *Runoff forecasting, Rainfall-runoff relationships, Sediment transport, Stochastic processes, Synthetic hydrology, Watershed management, Arizona.
Identifiers: *Stochastic runoff model, Walnut Gulch Experimental Watershed(Ariz).

A description is presented of a sediment-yield model for ephermal streams, incorporating a stochastic model of runoff with a deterministic sediment-transport relation. The model was developed and verified with field data from the Walnut Gulch Experimental Watershed in southeastern Arizona. The stochastic and sediment-transport models are described. Comparisons between observed and synthetic runoff data indicate that the model produces data comparable to observed facts except for season length variability; however, the mean season length values correspond. Log-normal distributions were fitted to the synthetic annual runoff and sediment data produced with this model. A plot of annual runoff volumes for 50-year sequences of synthetic data on each of two watersheds is graphed and analyzed, with a similar plotting of synthetic annual sediment-yield data. Sediment and runoff volumes for any probability were greater for the larger watershed although the mean annual runoff was less. Possible applications and limitations of the model are discussed and recommendations for future work outlined. (Jahns-Arizona)
W76-11512

HUTTON'S SHEARWATERS INITIATING LOCAL SOIL EROSION IN THE SEAWARD KAIKOURA RANGE,
Forest and Range Experiment Station, Rangiora (New Zealand).
G. R. Evans.
N Z J Sci. 16(3), p 637-642, 1973.

Descriptors: Grasses, Erosion, *Soil erosion, *Vegetation effects, *Turf grasses, Deer, Goats.
Identifiers: Chamois, Chionochloa, *New Zealand, Puffinus-Buttoni, *Shearwaters, Snowgrass swards, Sea birds.

When Hutton's shearwaters (Puffinus buttoni) first occupy a new nesting site the initial destruction of the snowgrass sward (Chionochloa spp.) is rapid. With the continued destruction of these sites by the shearwaters, aided by goats, deer and chamois, the snowgrass swards are killed; this allows severe erosion to proceed at high altitudes in the Seaward Kaikoura Range (New Zealand).--Copyright 1974, Biological Abstracts, Inc.
W76-11518

2K. Chemical Processes

AN INVESTIGATION OF THREE METHODS FOR THE DETERMINATION OF SUB-MICROMOLAR ION CONCENTRATIONS IN WATER,
Wisconsin Univ., Madison. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W76-11331

STREAM SEDIMENT COMPOSITION: AN AID TO WATER QUALITY ASSESSMENT,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group.
For primary bibliographic entry see Field 5A.
W76-11367

SIMPLIFIED KJELDAHL NITROGEN DETERMINATION FOR SEAWATER BY A SEMIAUTOMATED PERSULFATE DIGESTION METHOD,
Suffolk County Dept. of Environmental Control, Hauppauge, N.Y.
For primary bibliographic entry see Field 5A.
W76-11396

MICROGRAM DETERMINATION OF BORON IN SURFACE WATERS BY ATOMIC EMISSION SPECTROMETRY,
Utah State Div. of Health, Salt Lake City. Bureau of Labs.
For primary bibliographic entry see Field 5A.
W76-11397

GROUND-WATER RESOURCES AND WATER USE IN SOUTHERN NAVAJO COUNTY, ARIZONA,
Geological Survey, Tucson, Ariz.
For primary bibliographic entry see Field 2F.
W76-11410

HYDROLOGIC RECORDS FOR LAKE COUNTY, FLORIDA, 1973-74,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7C.
W76-11414

THE NATIONAL STREAM QUALITY ACCOUNTING NETWORK,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 5A.
W76-11419

THE VOLUMETRIC PROPERTIES OF H20--A GRAPHICAL PORTRAYAL,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 1A.
W76-11420

WETTABILITY OF HUMIC ACID AND ITS SALTS,
M. Tschapek, and G. P. Ardizzi.
Z Pflanzenernaehr Bodenkd. 135(1), p 16-31, 1973.

Descriptors: *Wettability, *Humic acid, Salts, Organic compounds, Ions, Pollutant identification.
Identifiers: *Humates, Humic-Acid.

Homoionic humates are readily wetted by hydrocarbons (apolar liquid) and water (polar liquid). By wetting with hydrocarbons low heats of immersion (or wetting) are registered, whereas by wetting with water high heats of immersion are registered and colloidal solutions are formed. Humic acid is wetted by hydrocarbons, producing low heats. It floats on the water surface, and produces the heat of immersion. The surfaces of humic acid and humate are covered by hydrophilic and hydrophobic sites. Humic acid and humate contain about 2 hydrophobic sites/100A2.--Copyright 1974, Biological Abstracts, Inc.
W76-11421

WATER QUALITY OF STREAMFLOW FROM PONDEROSA PINE FOREST WATERSHEDS ON SEDIMENTARY SOILS,
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 5A.
W76-11490

RATIONALIZATION OF IONIC STRENGTH AND CATION EFFECTS ON PHOSPHATE SORPTION BY SOILS,
Massey Univ., Palmerston North (New Zealand). Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W76-11507

STUDY OF WATER SORPTION ON BIOPOLYMERS, (IN RUSSIAN).
Politekhnicheskii Institut, Leningrad (USSR).c
N. I. Gamayunov, L. Y. Vasil'eva, and V. M. Koshkin.
Biofizika. 20(1), p 38-40, 1975..

Descriptors: *Sorption, *Polymers, Moisture content, *Nuclear magnetic resonance, Cellulose, Analytical techniques, Adsorption, Conductivity.
Identifiers: *Biopolymers, *Dielectric studies, Starch, Gelatin.

NMR-spin echo and dielectric studies of water in biopolymers were carried out. The data on the relationship between the time of spin-spin relaxation, the energy of movement activation and electroconductivity, and moisture-content indicate that water sorption on biopolymers e.g. gelatin, starch, cellulose, up to a certain humidity value, takes place in a vacuum. With an increase of moisture-content the proces of sorption may be presented as a solution of low-molecular substance in a high-molecular one.--Copyright 1975, Biological Abstracts, Inc.
W76-11532

THE STATISTICAL APPROACH TO THE STUDY OF THE SMALL RIVERS HYDROCHEMICAL REGIME IN WESTERN POLESYE OF THE UKRAINIAN SSR, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hydrobiologii.
For primary bibliographic entry see Field 5A.
W76-11536

EVOLUTION OF THE CATIONS INVOLVED IN RAIN, CANOPY LEACHATE AND DRAINAGE WATER THROUGH A FOREST ECOSYSTEM, (IN FRENCH),
Washington Univ., Seattle. Coll. of Forest Resources.
For primary bibliographic entry see Field 2G.
W76-11540

RAPID DETERMINATION OF NO3 IN WATER, (IN ROMANIAN),
Institutul Agronomic, Bucharest (Rumania).
For primary bibliographic entry see Field 5A.
W76-11559

DECREASE OF STRONTIUM-90 CONTENT IN THE TUNDRA SOIL-VEGETATION COVER, (IN RUSSIAN),
Ural Science Center, Sverdlovsk (USSR). Inst. of Plant and Animal Ecology.
N. V. Kulikov, and I. V. Molchanova.
Ekologiya 5(2), p 69-70, 1974.

Descriptors: *Strontium radioisotopes, *Tundra, Vegetation, Soil analysis, Soil water, Plant physiology, Surface waters, Bogs.
Identifiers: *Strontium-90, *USSR, *Biogecoenoses.

Data are presented on the change of Sr90 content in the soil and plants of the subarctic tundra between 1966 and 1970. During this period the total content of the radionuclide in tundra plants dropped from 53-17% in the soil-vegetation cover and from 14-5% in the bog. This decrease of Sr90 concentration in plants should have resulted in an increase of its content in the upper soil layers. Sr90 concentration in the soil did not increase but rather decreased. This was attributed to the removal of the radionuclide from biogeocoenoses by surface and soil waters.--Copyright 1976, Biological Abstracts, Inc.
W76-11565

2L. Estuaries

PROCEEDINGS OF THE SOUTHEASTERN CONFERENCE ON WATER SUPPLY AND WASTEWATER IN COASTAL AREAS,
North Carolina Water Resources Research Inst., Raleigh.
For primary bibliographic entry see Field 5D.
W76-11224

WATER SUPPLY AND WASTEWATER DISPOSAL - PLANNING AND PROBLEMS - IN COASTAL AREAS,
Oesen (Henry von) and Associates, Inc., Wilmington, N. C.
For primary bibliographic entry see Field 5D.
W76-11225

OCEAN OUTFALL DISPOSAL SYSTEMS,
Engineering-Science, Inc., Berkeley, Calif.
For primary bibliographic entry see Field 5D.
W76-11226

THE ROLE OF CONVENTIONAL WASTEWATER TREATMENT IN COASTAL AREAS,
North Carolina Univ. at Chapel Hill. Wastewater Research Center.
For primary bibliographic entry see Field 5D.
W76-11229

SUMMARY: TECHNOLOGICAL ALTERNATIVES FOR WATER SUPPLY AND WASTEWATER DISPOSAL IN THE COASTAL AREA,
Clemson Univ. S. C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5E.
W76-11230

EFFECTS OF WATER QUALITY ON THE RECREATIONAL USE OF WATER IN SOUTH EAST TEXAS,
Lamar Univ., Beaumont, Tex. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 5G.
W76-11335

ACUTE TOXICITIES OF SPRUCE AND HEMLOCK BARK EXTRACTS TO SOME ESTUARINE ORGANISMS IN SOUTHEASTERN ALASKA,
Alaska Dept. of Fish and Game, Petersburg.
For primary bibliographic entry see Field 5C.
W76-11393

DOCUMENTATION FOR ES001. A STEADY-STATE, ONE DIMENSIONAL, ESTUARINE WATER QUALITY MODEL,
Environmental Protection Agency, New York. Region II.
For primary bibliographic entry see Field 5B.
W76-11460

PROCEEDINGS OF THE SYMPOSIUM ON OFFSHORE OIL POTENTIAL AND RELATED LAND USE IMPACTS IN THE CENTRAL CALIFORNIA COASTAL ZONE.
California Univ., Santa Cruz, Coastal Marine Lab.
For primary bibliographic entry see Field 6G.
W76-11461

THE ALERT BAY OIL SPILL: A ONE-YEAR STUDY OF THE RECOVERY OF A CONTAMINATED BAY,
Environment Canada, Victoria, B. C. (Canada). Marine Sciences Directorate, Pacific Region.
For primary bibliographic entry see Field 5C.
W76-11463

TEXAS COASTAL MANAGEMENT PROGRAM. HEARING DRAFT. EXECUTIVE SUMMARY.
Texas General Land Office, Austin.
For primary bibliographic entry see Field 6B.
W76-11465

TEXAS COASTAL MANAGEMENT PROGRAM. HEARING DRAFT.
Texas General Land Office, Austin.
For primary bibliographic entry see Field 6B.
W76-11466

TEXAS COASTAL MANAGEMENT PROGRAM. HEARING DRAFT. APPENDICES.
Texas General Land Office, Austin.
For primary bibliographic entry see Field 6B.
W76-11467

FLORIDA COASTAL POLICY STUDY: THE IMPACT OF OFFSHORE OIL DEVELOPMENT,
Florida State Univ., Tallahassee. Dept. of Urban and Regional Planning.
For primary bibliographic entry see Field 6G.
W76-11468

DEEPWATER PORTS: POLICY ISSUES IN FLORIDA,
Florida State Univ., Tallahassee Dept. of Urban and Regional Planning.
For primary bibliographic entry see Field 6G.
W76-11473

BUREAU OF LAND MANAGEMENT'S ENVIRONMENTAL STUDIES PROGRAM FOR THE SOUTH ATLANTIC OUTER CONTINENTAL SHELF AREA. CONFERENCE/WORKSHOP PROCEEDINGS,
Research Triangle Inst., Research Triangle Park, N. C.
For primary bibliographic entry see Field 6G.
W76-11474

FRAMEWORK FOR BUREAU OF LAND MANAGEMENT PROGRAMS,
Bureau of Land Management, Washington, D.C. Outer Continental Shelf Environmental Studies Program.
For primary bibliographic entry see Field 6G.
W76-11476

GEOLOGICAL OCEANOGRAPHY CONSIDERATIONS,
Duke University, Durham, N. C.
For primary bibliographic entry see Field 6G.
W76-11482

PHYSICAL OCEANOGRAPHY CONSIDERATIONS,
State Univ. System of Florida Inst. of Oceanography, St. Petersburg.
For primary bibliographic entry see Field 6G.
W76-11483

BIOLOGICAL CONSIDERATIONS,
Duke Univ., Beaufort, N. C. Marine Lab.
For primary bibliographic entry see Field 6G.
W76-11484

CONCLUSION AND RECOMMENDATIONS CONFERENCE/WORKSHOP,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 6G.
W76-11485

TRANSVERSE DISPERSION IN PARTIALLY STRATIFIED TIDAL FLOW,
California Univ., Berkeley. Dept. of Civil Engineering.
S. M. Sumer.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 582, $8.00 in paper copy, $3.00 in microfiche. Report UHM-20, Hydraulic Engineering Laboratory, University of California, Berkeley, California, May 1976. 218 p, 67 fig, 10 tab, 36 ref, 3 append. (California Water Resources Center Project UCAL-WRC-W-486).

Descriptors: *Mixing, *Saline water-freshwater interfaces, Estuaries, Tidal waters, Flow, *Open channel flow, Path of pollutants, *Dispersion, *Stratified flow, *Density stratification, Circulation.
Identifiers: *Transverse dispersion.

This study investigates the transverse mixing characteristics of a tidal open channel flow both for neutrally buoyant flow and a partially stratified flow. The effect of the geometry of the cross-section on lateral mixing is investigated by experiments made in uniform and nonuniform cross-sections. The first part deals with the influence of vertical density stratification on the rate of transverse dispersion without the presence of any transverse circulation. In the second part, the effect of nonuniformity of the cross-sectional area on transverse mixing is investigated; an effect of the nonuniformity is the creation of transverse density gradients and transverse circulation patterns. (Snyder-California, Davis)
W76-11486

FOOD HABITS OF YEARLING AND ADULT STRIPED BASS, MORONE SAXATILIS (WALBAUM), FROM ALBEMARLE SOUND, NORTH CAROLINA,
National Marine Fisheries Service, Beaufort, N. C. Atlantic Estuarine Fisheries Center.
For primary bibliographic entry see Field 2I.
W76-11522

THE IMPORTANCE OF INHIBITING SUBSTANCES IN THE CONTROL OF ALGAL AND BACTERIAL POPULATIONS OF MARINE PLANKTON, (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
For primary bibliographic entry see Field 5G.
W76-11542

EFFECT OF THE DEGREE OF VACUUM USED IN FILTRATION ON THE SIMULTANEOUS MEASUREMENT OF ASSIMILATION AND EXCRETION BY PHYTOPLANKTON ORGANISMS, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Abidjan (Ivory Coast). Centre de Recherches Oceanographiques.
For primary bibliographic entry see Field 5C.
W76-11554

PRIMARY PRODUCTION IN THE MAURITANIAN UPWELLING IN MARCH 1973, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Abidjan (Ivory Coast). Centre de Recherches Oceanographiques.
For primary bibliographic entry see Field 5C.
W76-11555

RADIOACTIVITY IN THE MEDITERRANEAN SEA, (IN ITALIAN),
Parma Univ. (Italy). Instituto di Zoologia.
For primary bibliographic entry see Field 5A.
W76-11558

PRIMARY PRODUCTION AND BIOTIC BALANCE OF PLANKTON IN THE

NORTHEASTERN PART OF THE AMUR BAY, (IN RUSSIAN),
Akademiya Nauk SSSR, Vladivostok. Institut Morskogo Biologii.
For primary bibliographic entry see Field 5C.
W76-11576

RELATION BETWEEN GENERATION TIME AND BIOMASS OF PHYTOPLANKTON, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Hydrobiology.
For primary bibliographic entry see Field 5C.
W76-11577

THE DISTRIBUTION OF NUTRIENT SALTS IN THE MORLAIX BAY (FINISTERE, FRANCE): THE ROLE OF BENTHIC ALGAE, (IN FRENCH),
Brussels Univ. (Belgium). Lab. of Oceanography.
For primary bibliographic entry see Field 5B.
W76-11583

SUPERSHRIMP: DEEP BIOTURBATION IN THE STRAIT OF CANSO, NOVA SCOTIA,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 5C.
W76-11584

ORGANIC POLLUTION IN ENSENADA BAY, MEXICO,
Centre d' Oceanographie, Marseille (France). Station Marine d'Endoume.
For primary bibliographic entry see Field 5B.
W76-11587

REDUCTION OF FIELD POPULATIONS OF FIDDLER CRABS BY UPTAKE OF CHLORINATED HYDROCARBONS,
Marine Biological Lab., Woods Hole, Mass
Boston Univ. Marine Program.
For primary bibliographic entry see Field 5C.
W76-11588

PCB LEVELS IN CLYDE MARINE SEDIMENTS AND FAUNA,
Clyde River Purification Board, Glasgow (Scotland).
For primary bibliographic entry see Field 5B.
W76-11589

ANTIMICROBIAL-RESISTANT COLIFORMS IN NEW YORK BIGHT,
Montclair State Coll., Upper Monclair, N. J. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W76-11590

FLUORIDE IN MARINE ANIMALS,
Newcastle-upon-Tyne Univ. (England). Dept. of Plant Biology.
For primary bibliographic entry see Field 5C.
W76-11593

MIDSUMMER METABOLISM OF AN EELGRASS COMMUNITY,
Georgia Univ., Athens. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W76-11594

FINE PARTICLES AND WATER QUALITY IN THE COASTAL MARINE ENVIRONMENT,
State Univ. of New York at Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 5B.
W76-11612

IMPACT OF WATER SUPPLY AND WASTEWATER ON THE COASTAL AND MARINE ENVIRONMENTS,
North Carolina State Univ., Raleigh. Sea Grant Program.
For primary bibliographic entry see Field 5D.
W76-11625

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

AWT ENERGY NEEDS A PRIME CONCERN,
Orange County Water District, Fountain Valley, Calif. Board of Directors.
For primary bibliographic entry see Field 5D.
W76-11198

REVERSE OSMOSIS PILOT PLANT STUDIES FOR THE PURIFICATION AND REUSE OF EFFLUENT FROM A SANITARY WASTE TREATMENT PLANT,
Rockwell International, Golden, Colo. Rocky Flats Plant.
For primary bibliographic entry see Field 5D.
W76-11267

TREATMENT OF ARMY M U S T FIELD HOSPITAL WASTEWATER FOR WATER REUSE,
Abcor, Inc., Cambridge, Mass. Walden Research Div.
For primary bibliographic entry see Field 5D.
W76-11270

ANNUAL REPORT - VTE/MSF MODULE - FOUNTAIN VALLEY TEST FACILITY, JULY 1, 1975 - APRIL 30, 1976.
Burns and Roe Industrial Services Corp., Paramus, N. J.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 572, $7.50 in paper copy, $3.00 in microfiche. Office of Water Research and Technology, Report OWRT/S--76/51, April 1976. 181 p, 50 fig, 42 tab. DOI-14-30-3164 14-34-0001-6518.

Descriptors: *Desalination plants, *Desalination processes, *Distillation, *Heat transfer, Sea water, Operating and maintenance, Corrosion, California, Fouling.
Identifiers: *VTE/MSF Module, *Fountain Valley(Calif), Calcium sulfate, Cuprous oxide.

This is the final report on operation and developmental activities on the VTE/MSF sea water desalting test module at Fountain Valley, California. Because of severe noise, emitted primarily from the boiler area, module operations were restricted to daylight hours, five (5) days a week. Technical data were collected in four (4) modes of operation. Extensive heat transfer data were collected over a temperature range of 110F to 220F and new design equations were developed for the combined VTE/MSF process. Heat transfer coefficients for all four (4) VTE bundles are given. Heat exchanger tube corrosion rates are given for all operating modes. Calcium sulfate and cuprous oxide caused fouling in the VTE bundles. (OWRT)
W76-11325

PROCESS FOR THE REGENERATION OF ION-EXCHANGE RESINS AND APPLICATIONS THEREOF,
Institutul de Proiectari Pentru Industria Chimica Anorganica si Ingrasamintelor, Bucharest (Rumania). (Assignee).
N. M. Arion.
U.S. Patent No. 3,956,115, 7 p, 4 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 946, No 2, p 727, May 11, 1976.

Descriptors: *Patents, *Water purification, *Water treatment, *Desalination, *Demineralization, *Ion exchange, Resins, Anion exchange, Cation exchange.
Identifiers: *Resin regeneration.

The invention relates to a process for the regeneration of cationic and anionic ion-exchange resins, with concentrated acids or bases, thereby obtaining a concentrated effluent from which the eluated salt and the possible excess of regenerant are advantageously recovered. The concentrations of the acids and bases used in regeneration are much higher than those known as used heretofore. The process is carried out under conditions such that the resin temperature at the regenerant liquid/resin bead interface does not exceed a maximum of about 20C. An important decrease of the heat amount released in regeneration is reached by the removal, prior to introducing the concentrated regenerant, of the water from the ion exchange resin interstices. The elimination of the liquid from the interstices of the ion exchange resin, water or concentrated regenerant, may be performed by blowing-in of compressed air or inert gas, by vacuum suction, by centrifuging, or by combining these two means. The purification and valorization of waste waters and diluted solutions by fixing their components on ion exchangers, that may be regenerated according to the invention, leads not only to their purification. The water resulting as effluent is an advancedly demineralized water of high purity. (Sinha-OEIS)
W76-11447

WIND-SOLAR POWER INSTALLATIONS FOR WATER RAISING AND DISTILLATION, (IN RUSSIAN),
Akademiya Nauk Turkmenskoi SSR, Ashkhabad. Fiziko-Tekhnicheskii Institut.
R. Bairamov, S. Seiitkurbanov, Kh. Khallyev, and V. Agadzhanov.
Probl Osvoeniya Pustyn'. 4, p 71-76, 1974.

Descriptors: *Distillation, Costs, *Desalination plants, Energy, *Solar distillation, Salinity, Water supply, Groundwater, Water yield improvement, Water wells.

Research is proceeding on the designing of arrangements for water raising and distillation utilizing the energy of the sun and wind. Wind-solar power installation in combination with a distilling plant is recommended. Cost/performance is studied in response to the salinity rate and depth of underground waters. Water is to be provided for human consumption and range land production for sheep.--Copyright 1975, Biological Abstracts, Inc.
W76-11524

THE PRINCIPAL ASPECTS OF DESALINATION OF SURFACE WATERS OF THE TROPICAL SOUTHWESTERN PACIFIC, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Noumea (New Caledonia). Centre ORSTOM de Noumea.
For primary bibliographic entry see Field 2D.
W76-11539

STUDY OF THE EFFECT OF WATER DESALINATED BY ELECTRODIALYSIS ON SOME BIOLOGICAL OBJECTS, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Selskoi Gigieny, Saratov (Gigieny).
For primary bibliographic entry see Field 5D.
W76-11548

THE AVAILABILITY OF DESALTING FOR WATER SUPPLY FROM SALINE SOURCES,
Office of Water Research an Technology, Washington, D. C.
W. L. Barnes, Jr.
In Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, University of North Carolina, p 102 110.

Descriptors: *Desalination, *Distillation, *Crystallization, *Reverse osmosis, *Electrodialysis, *Ion exchange, Separation techniques, Desalnation processes, Membranes, Brackish water, Saline water, Freezing, Treatment facilities, Coasts, Florida.
Identifiers: Eutectic freezing.

A review of the state of the art of various desalination processes is presented. These processes fall into two categories: those involving a phase change such as distillation or crystallization and those which remove salts from water in the liquid phase by such mechanisms as reverse osmosis, electrodialysis, or ion exchange. Distillation processes account for about 93% of all desalination activities throughout the world. Membrane processes, along with ion exchange, are historically the preferred methods for desalting brackish waters, though seawater membrane desalting systems operate at a relatively low product water recovery amounting to about 30%. Eutectic freezing offers a process universally acceptable for all types of saline waste streams and does not require pre-treatment. An additional advantage of the process is its high product recovery which amounts to over 99% of the initial saline water treated. The practicality of desalination is being demonstrated in the southeastern coastal states, particularly Florida, where desalting piants are used to treat brackish water. (See also W76-11224) (Kreager-FIRL)
W76-11619

3B. Water Yield Improvement

UNDERGROUND STORAGE OF STATE WATER PROJECT SUPPLY, A PROGRESS REPORT,
Los Angeles City Dept. of Water and Power. Aqueduct Div.
For primary bibliographic entry see Field 4B.
W76-11119

3C. Use Of Water Of Impaired Quality

EFFECT OF DILUTED SEA WATER ON THE BASE STATUS OF AN ACID SOIL,
West Pakistan Agricultural Univ., Lyallpur. Dept. of Soil Sciences.
For primary bibliographic entry see Field 2G.
W76-11131

EXPERIENCES AT PENN STATE WITH LAND APPLICATION,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 5D.
W76-11234

PUERTO RICO: ALONG THE ROUTE OF WATER REUSE,
Environmental Protection Agency, San Juan, Puerto Rico.
For primary bibliographic entry see Field 5D.
W76-11259

PRODUCTION OF PLANTS CONDUCIVE TO SALT TOLERANCE,
Colorado State Univ., Fort Collins. Dept. of Botany and Plant Pathology.
M. W. Nabors.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 764, $4.50 in paper copy, $3.00 in microfiche. Colorado Environmental Resources Center, Fort Collins, Completion Report Series No. 73, July 1976. 35 p, 4 fig, 2 tab, 79 ref, append. OWRT B-143-COLO (1) 14-31-0001-5142.

Descriptors: *Salts, *Water quality, Water pollution, Agriculture, *Salt tolerance, Plant tissues, Plant physiology, Cytological studies, Plant morphology, Tobacco.
Identifiers: Salt tolerant mutants, Plant mutations.

Much successful work has been done on altering the environment by irrigation to increase the amount of land in agricultural production, however the costs may increase as suitable water becomes more difficult to develop. The alternative may be to adjust the plants to accept lower quality water through selection for appropriate spontaneous mutants. Methods for the selection of desirable spontaneous mutants require the application of environmental pressure to give the mutant a competitive advantage and also require the examination of millions of individual plants. To accomplish this in field trials is time consuming and costly. Instead this project employs individual cells in tissue culture where ten million cells occupy 100 ml and each cell effectively is a plant, because a plant can be regenerated from an individual cell. Plant properties such as salt tolerance which is exhibited on the cellular level can be selected in tissue culture at much less cost due to the small scale required. The focus of this project has been toward the selection of salt tolerant mutants. Two lines of tobacco cells, tolerant to NaCl levels of 8000 ppm, have been selected; normal tolerance to NaCl in this species is 800 ppm. Plants have been regenerated from the tissue cultures at many levels of NaCl tolerance between these extremes, and these plants are currently being tested for NaCl tolerance and for mutation inheritability. Although practical tolerance needs may not exceed 2000-3000 ppm, the higher ranges of salt tolerance may yield mutants with better yields at the moderate tolerance levels. Considerable progress has been made toward tissue culture mutant selection systems for oats, wheat, soybean, corn, and sugar beets. Selection for salt tolerant mutants is currently underway for both oats and wheat.
W76-11494

FERTILIZING DRYLAND GRAIN SORGHUM ON UPLAND SOILS THE 20- TO 26- INCH RAINFALL AREA IN KANSAS,
Kansas State Univ., Hays. Fort Hays Branch Experiment Station.
For primary bibliographic entry see Field 3F.
W76-11516

WIND-SOLAR POWER INSTALLATIONS FOR WATER RAISING AND DISTILLATION, (IN RUSSIAN),
Akademiya Nauk Turkmenskoi SSR, Ashkhabad. Fiziko-Tekhnicheskii Institut.
For primary bibliographic entry see Field 3A.
W76-11524

CHARACTERISTICS OF THE QUALITY OF IRRIGATION WATER ON THE BAGAEVSK-SADKOVSK IRRIGATION SYSTEM, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W76-11566

DETOXICATION IN PLANTS OF TOXIC SUBSTANCES FROM INDUSTRIAL SEWAGE USED FOR IRRIGATION, (IN RUSSIAN),
Central Research Station Agricultural Use Sewage, Noginsk (USSR).
For primary bibliographic entry see Field 5C.
W76-11567

WASTEWATER REUSE IN COASTAL AREAS,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5D.
W76-11620

3D. Conservation In Domestic and Municipal Use

MARGINAL POLLUTION ANALYSIS FOR LONG RAGE FORECASTS,
Cornell Univ., Ithaca, N. Y. Center for Urban Development Research.
For primary bibliographic entry see Field 5G.
W76-11127

INTERACTIONS BETWEEN LAND USE AND URBAN WATER RESOURCES PLANNING,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
For primary bibliographic entry see Field 4A.
W76-11130

VILLAGE WATER SUPPLY, A WORLD BANK PAPER.
International Bank for Reconstruction and Development, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11143

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES. PHASE I. FINAL REPORT,
Purdue University, West Lafayette, Indiana, Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W76-11175

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: REGIONAL AQUIFER EVALUATION STUDIES WITH STOCHASTIC INPUTS,
Purdue University, West Lafayette, Indiana, Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W76-11176

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: POPULATION CHARACTERISTICS AND RESIDENTIAL WATER USE,
Purdue Univ., Lafayette, Ind. Dept. of Sociology and Anthropology.
For primary bibliographic entry see Field 6B.
W76-11177

PROCEEDINGS OF THE THIRD NATIONAL CONFERENCE ON COMPLETE WATERUSE: SYMBIOSIS AS A MEANS OF ABATEMENT FOR MULTI-MEDIA POLLUTION,
For primary bibliographic entry see Field 5D.
W76-11257

AN ECONOMETRIC FORECASTING MODEL FOR THE MAJOR METROPOLITAN AREAS IN THE LAKE ERIE BASIN,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Economics.
For primary bibliographic entry see Field 5B.
W76-11322

PROCESS WASTEWATER: RECLAMATION OR DISPOSAL,
Sandwell International Inc., Atlanta, Ga.
For primary bibliographic entry see Field 5D.

W76-11376

WICHITA FALLS INTEGRATED MUNICIPAL INFORMATION SYSTEM, WATER UTILITY PROCESSING SYSTEM (WUPS), APPLICATION COMPLETION REPORT, VOLUME I.
Available from the National Technical Information Service, Springfield, Va 22161, PB-247 781, $12.00 in paper copy, $3.00 in microfiche. Report USAC WFT2-5019, June, 1975. 789 p, 14 fig, 9 append.

Descriptors: *Local governments, *Cost-benefit analysis, *Documentation, *Cities, *Municipal water, Sewerage, Computers, Water resources, *Texas, Computer programs.
Identifiers: *Information systems, *Urban Information Systems Interagency Committee, *Wichita Falls(Tex), *Water Utility Processing System.

An Urban Information Systems Inter-Agency Committee (USAC) Project in Wichita Falls, Texas, applies computer use to the full range of municipal functions. It is divided into several systems, including the Water Utility Processing System (WUPS), designed to support Wichita Falls in selling its water resources with associated services. The system is designed to provide for determining the cost of refuse, water, sewer, and assessment services, billing each customer, and collecting payment on the accounts. The hardware for the system includes an International Business Machines (IBM) 370/145 computer, storage devices, five tape drives, a reader/punch, 19 video terminal devices, and a cartridge reader. The software consists of IBM's Disk Operating System/Virtual Storage (DOS/VS), IBM's Customer Information Control System (CICS) for telecommunications, and a spooling system. (See also W76-11597) (Snyder-FIRL)
W76-11596

WICHITA FALLS INTEGRATED MUNICIPAL INFORMATION SYSTEM, WATER UTILITY PROCESSING SYSTEM (WUPS), APPLICATION COMPLETION REPORT, VOLUME II.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-247 782, $18.75 in paper copy, $3.00 in microfiche. Report USAC WFT2-5020, June, 1975. 433 p, 34 fig, 79 tab.

Descriptors: *Local governments, *Cost-benefit analysis, *Documentation, *Cities, *Municipal water, Sewerage, Computers, Water resources, *Texas, Computer programs.
Identifiers: *Information systems, *Urban Information Systems Interagency Committee, *Wichita Falls(Tex), *Water Utility Processing System.

An Urban Information Systems Inter-Agency Committee (USAC) Project in Wichita Falls, Texas, applies computer use to the full range of municipal functions. It includes the Water Utility Processing System (WUPS), which supports Wichita Falls in selling its water resources with associated services. The purpose of the system is determining the cost of refuse, water, sewer, and assessment services, billing each customer, and collecting payment on the accounts. Volume II contains the appendix on User Department procedures, which completes the description of this system. It contains procedures describing processes performed by User Department personnel for the functions developed for the system. The hardware for the system includes an International Business Machines (IBM) 370/145 computer, storage devices, five tape drives, a reader/punch, 19 video terminal devices, and a cartridge reader. The software consists of IBM's Disk Operating System/Virtual Storage (DOS/VS), IBM's Customer Information Control System (CICS) for telecommunications, and a spooling system. (See also W76-11596) (Snyder-FIRL)
W76-11597

URBAN STORMWATER MANAGEMENT MODELING AND DECISION-MAKING,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
For primary bibliographic entry see Field 5D.
W76-11599

WATER QUALITY MANAGEMENT PLANNING FOR URBAN RUNOFF.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5D.
W76-11600

3E. Conservation In Industry

PROCEEDINGS OF THE THIRD NATIONAL CONFERENCE ON COMPLETE WATERUSE: SYMBIOSIS AS A MEANS OF ABATEMENT FOR MULTI-MEDIA POLLUTION,
For primary bibliographic entry see Field 5D.
W76-11257

REMOVAL AND RECOVERY OF AMMONIA FROM ANAEROBIC DIGESTER SUPERNATANT,
CH2M/Hill, Redding, Calif.
For primary bibliographic entry see Field 5D.
W76-11260

UNION CARBIDE'S REUSE OF SEWAGE WATER,
Carbide Chemicals Co., Bombay, India.
For primary bibliographic entry see Field 5D.
W76-11261

WASTEWATER RECYCLE - THE PROPER APPROACH TO EVALUATION OF DISPOSAL VERSUS REUSE,
Ecodyne Corp., Union, N. J. Industrial Waste Treatment Div.
For primary bibliographic entry see Field 5D.
W76-11263

PROCESS WASTEWATER: RECLAMATION OR DISPOSAL,
Sandwell International Inc., Atlanta, Ga.
For primary bibliographic entry see Field 5D.
W76-11376

THE EFFLUENT-FREE BLEACHED KRAFT PULP MILL. PART VI. SUBSTANTIAL SUBSTITUTION OF CHLORINE DIOXIDE FOR CHLORINE IN THE FIRST STAGE OF BLEACHING,
Toronto Univ. (Ontario). Dept. of Chemical Engineering.
W. H. Rapson, C. B. Anderson, and D. W. Reeve.
In: TAPPI Alkaline Pulping Conference, Williamsburg, Virginia, October 27-29, 1975, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 177-188. 3 fig, 5 ref, 6 tab.

Descriptors: *Water pollution control, *Bleaching wastes, Pulp and paper industry, Water pollution sources, Chlorine, Toxicity, Biochemical oxygen demand, Chemical oxygen demand, Chlorides, Color, Acidity, Corrosion, Closed conduit flow, Pollution abatement, Canada, Foreign countries, Sodium chloride.
Identifiers: Kraft mills, *Chlorine dioxide, Sodium hydroxide, Closed systems.

Studies showed that substantial substitution of chlorine dioxide for chlorine in the first stage of kraft pulp bleaching improves pulp yield, strength, color stability, and cleanliness. Bleach plant effluent properties are also greatly improved; with 70% replacement, color is decreased by about one-half, toxicity is nearly eliminated, BOD and COD are decreased 15-20%, and chloride content is decreased to one-half that found with 100% chlorine in the first stage. The NaOH required for extraction is decreased substantially, and in an effluent-free mill it is decreased to one-half compared with all chlorine. As chlorine dioxide is substituted for chlorine, acidity and chloride concentration are decreased, thereby decreasing corrosivity. When pollution is eliminated by introducing bleach plant effluent into the recovery system, 70% replacement of chlorine by chlorine dioxide decreases to one-half the quantity of NaCl introduced into the pulping chemical recovery cycle. The new closed-cycle bleached kraft pulp mill now under construction at Great Lakes Paper Co., Thunder Bay, Ontario, is designed to use a mixture of 70% chlorine dioxide and 30% chlorine to supply the necessary available chlorine in the first bleaching stage. (See also W74-07379; W74-07378; and W74-05275) (Witt-IPC)
W76-11382

HANDLING AND DISPOSAL OF BLEACH PLANT EFFLUENTS,
Longview Fibre Co., Wash.
For primary bibliographic entry see Field 5D.
W76-11383

WATER REUSE AND RECYCLE IN THE C(D)EHDED BLEACH SEQUENCE,
CIP Research Ltd., Hawkesbury (Ontario).
J. A. Histed, and F. M. A. Nicolle.
In: TAPPI Alkaline Pulping Conference, Williamsburg, Virginia, October 27-29, 1975, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 167-170. 3 fig, 5 ref, 6 tab.

Descriptors: *Bleaching wastes, *Water reuse, *Pulp and paper industry, Water pollution sources, Wastes, Industrial wastes, Water pollution control, *Recycling, Waste treatment, Waste water treatment, Industrial water, Effluents, Water conservation.
Identifiers: Wash water, Washing(Pulp), Countercurrent washing.

The low temperature normally associated with the hypochlorite stage of the C(D)EHDED bleach sequence has presented a serious obstacle to direct countercurrent pulp washing. This study demonstrates that the hypochlorite stage can be operated at 80C (176 F) in a tight countercurrent washing system with no adverse effect on the properties of the fully bleached pulp. Extensive recycling of the chlorination filtrate reduced the volume of effluent from the chlorination washer to 491 gallons/air-dry ton. The total effluent from the EHDED stages was reduced to 976 gallons/air-dry ton by means of a tight countercurrent washing system. This represents a 10-fold reduction effluent volume when compared with the present-day practice of most mills using this bleaching sequence. (Witt-IPC)
W76-11385

IMPROVED SYSTEM FOR THE PURIFICATION OF WASTE WATERS AT THE LVOV BOARD MILL (UDOSKONALENA SKHEMA OCHISTKI STICHNIKH VOD NA I'VIVS'KIIKARTONI FABRITSI,
For primary bibliographic entry see Field 5D.
W76-11392

POLLUTION MANAGEMENT IN THE PAPER AND PAPERBOARD INDUSTRY.
For primary bibliographic entry see Field 5G.
W76-11400

LEGAL INSTITUTIONS FOR THE ALLOCATION OF WATER AND THEIR IMPACT ON COAL CONVERSION OPERATIONS IN KENTUCKY,
Kentucky Univ., Lexington.
For primary bibliographic entry see Field 6E.

W76-11489

BACTERIAL AND COLIFORM COUNTS IN THE WATER SUPPLY OF SLAUGHTER HOUSES SITUATED IN THE VICINITY OF SALVADOR-BAHIA: BRIEF NOTE, (IN PORTUGUESE),
Universidade Federal da Bahia, Salvador (Brazil).
For primary bibliographic entry see Field 5A.
W76-11525

3F. Conservation In Agriculture

ENERGY REDUCTION THROUGH IMPROVED IRRIGATION PRACTICES,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
J. R. Gilley, and D. G. Watts.
Available from the National Technical Information Service, Springfield, Va., 22161, as PB-256 208, $4.00 in paper copy, $3.00 in microfiche. Presented at Energy and Agriculture Conference, St. Louis, Missouri, June 16-19, 1976. (1976). 26 p, 4 fig, 4 tab, 22 ref. OWRT A-0380NEB(1), 14-34-0001-6028.

Descriptors: Irrigation, Management, Energy, Conservation, *Irrigation systems, *Water utilization, Pumping, *Pumping plants, *Irrigation practices, *Water conservation, Soil moisture, Irrigation efficiency, Costs.
Identifiers: *Energy conservation.

Because irrigation is such a large consumer of the total energy used in production agriculture, reduction of the energy used to pump water can have a significant impact on agriculture's energy requirements. This energy requirement can be lessened by reducing the amount of water pumped, improving the irrigation efficiency, improving the pumping plant performance and lowering the pressure requirements. Water and energy conservation are discussed relative to current irrigation practices and existing technology. Several possible areas are described where potential energy savings exist. The design of new equipment and improved management of irrigation systems will provide techniques to conserve both water and energy. These energy saving techniques can be used to insure a continued high level of production in the face of energy shortages, cost increases and limited water. Pump irrigators in the future may have to accept soil moisture deficits and the resulting reduced yields in some years because of short energy supplies and scheduled electrical power interruptions.
W76-11109

EFFECTS OF SULFUR DIOXIDE AND/OR OZONE ON SEVERAL OAT VARIETIES, 1975 ANNUAL REPORT,
North Carolina State Univ., Raleigh.
For primary bibliographic entry see Field 5C.
W76-11190

LAND DISPOSAL OF WASTEWATER,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 5E.
W76-11227

LAND APPLICATION OF WASTEWATER.
Environmental Protection Agency, Philadelphia, Pa. Region III.
For primary bibliographic entry see Field 5D.
W76-11231

A QUADRATIC PROGRAMMING APPROACH TO THE PRODUCTION OF CALIFORNIA FIELD AND VEGETABLE CROPS EMPHASIZING LAND, WATER AND ENERGY USE,
California Univ., Davis. Dept. of Agriculture Economics.
R. M. Adams.
Available from the National Technecial Information Service, Springfield, Va 22161, PB-256 594, $9.25 in paper copy, $3.00 in microfiche. Doctoral Dissertation, August 1975. 345 p, 10 fig, 52 tab, 115 ref. (California Water Resources Center Project UCAL-WRC-W-483).

Descriptors: *Energy, *Economics, *Economic efficiency, Supply, Demand, *California, Land use, Water utilization, *Crop production, Costs, Fuels, Fertilizers, Farm management, Forecasting, Field crops, Vegetable crops, Alternative costs, Prices.
Identifiers: Quadratic programming, Economics models.

California agriculture is continually adjusting to changing demand and supply conditions, but the events associated with the 'energy crisis' of 1973-74 appeared as an abrupt shift in production conditions rather than a random shock or a gradual trend in events of the past. An additional shock was adverse weather conditions in several important grain producing areas of the world resulting in increasing concern over food supplies both here and abroad, and the associated inflation due to rising food and energy prices. This thesis explores the effects of increases in energy costs (gasoline and diesel fuels) and energy-based inputs (nitrogen fertilizer) on the cropping pattern in California for an important set of commodities including major vegetable and field crops under alternative assumptions as to demand for the commodities. (Snyder - California, Davis)
W76-11326

EFFECTS OF WATER STRESS UNDER CONTRASTING ENVIRONMENTAL CONDITIONS ON TRANSPIRATION AND PHOTOSYNTHESIS IN SOYBEAN,
Department of Scientific and Industrial Research, Palmerston North (New Zealand) Plant Physiology Div.
M. F. Beardsell, K. J. Mitchell, and R. G. Thomas.
J Exp Bot. 24(80), p 579-586, 1973.

Descriptors: *Transpiration, *Photosynthesis, *Soybeans, Temperature, Stomata, Soil water, Root systems.
Identifiers: Glycine-Max, Mesophyll.

Continuous and simultaneous measurements of CO2 exchange and transpiration rates of whole soybean plants were made under contrasting, controlled environmental conditions when water stress was imposed by withholding H2O. Daytime temperatures and vapor pressure deficits were 27.5C/12 mbar; 27.5C/5 mbar; 22.5C/12 mbar, and 22.5C/5 mbar. The experimental conditions were virtually the same as the conditions under which the plants had been grown. Under all 4 treatments photosynthesis and transpiration rates were closely correlated as water stress increased, but in view of the evidence for a significant mesophyll resistance to photosynthesis in both stressed and unstressed plants it is not considered that this is due to total stomatal control. At -0.4 bar soil water potential (4 soil) the rates of transpiration and photosynthesis became independent of the atmosphere conditions and were very similar under all treatments. This was attributed to slow movement of H2O into the root zone from the surrounding soil with associated stomatal closure limiting the rates of water uptake and transpiration. With decreasing 4 soil, relative water content of the leaf (RWC) fell more rapidly and to lower levels under 27.5C/12 mbar conditions than under the other treatments. The least reduction in RWC was under the greatest relative effect on rates of gaseous exchange under 27.5C/12 mbar conditions and least under 22.5C/5 mbar conditions.--Copyright 1974, Biological Abstracts, Inc.
W76-11362

TRANSPIRATION AND PHOTOSYNTHESIS IN SOYBEAN: EFFECTS OF TEMPERATURE AND VAPOUR PRESSURE DEFICIT,
Department of Scientific and Industrial Research, Palmerston North (New Zealand) Plant Physiology Div.
M. F. Beardsell, K. J. Mitchell, and R. G. Thomas.
J Exp Bot. 24(80), p 587-595, 1973.

Descriptors: *Transpiration, *Photosynthesis, *Soybeans, Temperature, Vapor pressure.
Identifiers: Glycine-max, Mesophyll resistance.

Continuous and simultaneous measurements of CO2 exchange and transpiration rates of whole soybean plants were made under contrasting, controlled evironmental conditions for periods of up to 3 days. Daytime temperatures and vapor pressure deficits (VPD) were 27.5C/12 mb; 27.5C/mb; 22.5C/12 mb, 22.5C/ mb. Night temperatures were 5c lower than day temperatures and night VPD was 2.7 mb and 3.5 mb at the higher and lower temperature respectively. The experimental conditions were virtually the same as those under which the plants had been grown. Transpiration rates were higher at the higher VPD but were also influenced by temperature. At 12 mb VPD the rates were 16 per cent lower at 22.5C than at 27.5C. Temperature had no effect on the transpiration rate at 5 mb VPD. Photosynthesis rates were lower at 5 mb VPD than at 12 mb VPD at both temperatures: the difference was substantially greater (c. 70%) at 22.5C. Under all treatments mesophyll resistance (r'm) appeared to have a major effect on the photosynthetic rate, and varied more than twofold between treatments. r'm was highest in plants grown at 22.5C/5 mb VPD and lowest at 27.5C/12 mb VPD.--Copyright 1974, Biological Abstracts, Inc.
W76-11407

ROTATABLE SPRINKLER AND WATER DEFLECTOR USED THEREWITH,
Johns-Manville Corp., Denver, Colo. (Assignee).
P. N. Cassimatis, and J. R. McComas.
U. S. Patent No. 3,955,762, 7 p, 10 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 946, No 2, p 616, May 11, 1976.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, *Irrigation practices, *Irrigation efficiency, Water distribution(Applied), Application equipment, Nozzles, Deflection.

A rotatable impact sprinkler is described which includes a nozzle through which a jet of water issues. An oscillating arm has an end movable in front of and to one side of the nozzle. The sprinkler also includes a water deflector which is connected with this end of the oscillating arm and which is movable into and out of the water jet. The deflector includes three water deflecting surfaces which receive and redirect water from the jet in a smooth, substantially turbulent free manner. This water is first redirected along a first straight path at least approximately 90 degrees from the axis of the jet. It is then redirected along a second path at an acute angle with and in front of the first path and thereafter it is redirected along a third path which is approximately parallel with the axis of the issuing jet. (Sinha - OEIS)
W76-11445

SPRINKLER ADJUSTMENT,
Telsco Industries, Garland, Tex. (Assignee).
C. W. Phaup.
U. S. Patent No. 3,955, 764, 4 p, 5 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 946, No 2, p 617, May 11, 1976.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, *Irrigation practices, *Irrigation efficiency, Water distribution(Applied), Application equipment, Nozzles.
Identifiers: Pop-up sprinklers.

An adjustable nozzle for rotary pop-up sprinklers allows an operator to accurately position the arc of coverage to any desired location while the pop-up sprinkler is in operation without rotating the entire sprinkler relative to the riser on which it is threaded. The invention eliminates the need for special adjusting tools, and hides the fact that the nozzle can be adjusted from the intermeddler who tampers with easily accessible controls. (Sinha-OEIS)
W76-11446

EFFECTS OF IRRIGATION: MULCH AND N-FERTILIZERS ON YIELD COMPONENTS OF ARABICA COFFEE IN KENYA,
Edinburgh Univ. (Scotland). Inst. of Tree Biology.
M. G. R. Cannell.
Exp Agric. 9(3); p 225-232, 1973

Descriptors: *Irrigation effects, Africa, *Mulching, Fertilizers, *Crop production, *Nitrogen, Fruit crops.
Identifiers: *Kenya, Mulch, *Coffee(Arabica).

Irrigation, mulch and N-fertilizers increased the yield of fresh fruit/tree by 66% due to increases of 42% in the number of fruiting nodes/tree, 14% in number of fruits/node and 15% in fresh weight/fruit; these 3 yield components accounted for 42, 13 and 6% of the variation in yield among all treatments combinations, Bean/fruit weight ratios and times of flowering were not affected. Correlations between yield components were positive, suggesting that still more nodes could be produced per tree and per unit area before physiological limits to yield were reached.--Copyright 1973, Biological Abstracts, Inc.
W76-11456

CORN PLANT WATER STRESS AS INFLUENCED BY CHISELING, IRRIGATION, AND WATER TABLE DEPTH,
Agricultural Research Service, Florence, S.C. Coastal Plains Soil and Water Conservation Research Center.
D. C. Reicosky, R. B. Campbell, and C. W. Doty.
Agronomy Journal, Vol. 68, No. 3, p 499-503, May-June 1976. 5 fig, 3 tab, 7 ref.

Descriptors: *Corn(Field), *Water table, *Soil-water-plant relationships, *Crop production, Soil management, Crop response, *Irrigation effects, Stomata, Cultivation, Moisture stress, *Chiselling.

Chiseling and irrigation effects on plant water status were evaluated through leaf water potential, stem diameter and stomatal resistance measurements. Corn (Zeas mays L.) grown on a Varina sandy loam chiseled to 38 cm was compared with that grown on conventionally tilled plots. Chiseling had no effect on daily minimum leaf water potential the first year (1972) and only a slight effect on stomatal resistance, but irrigating had some beneficial effect. At tasseling in 1973, with a water table 80 cm from the surface, chiseling produced deeper-rooted corn that allowed water utilization in the capillary fringe above the water table; leaf water potential increased slightly while stomatal resistance and stem diameter fluctuation decreased. Plant-water status on chiseled plots was similar to that on furrow-irrigated plots. Improved midday plant water status caused a 8-metric ton/ha increase in corn ear yields. Results indicate that chiseling of soils with root restricting layers can increase corn production, especially when the water table is about 80 cm from the surface tasseling. (Jahns-Arizona)
W76-11503

SOIL WATER UPTAKE BY ALFALFA,
Agricultural Research Service, Kimberly, Idaho, Snake River Conservation Research Center.
R. A. Kohl, and J. J. Kolar.
Agronomy Journal, Vol. 68, No. 3, p 536-538, May-June 1976. 4 fig, 14 ref.

Descriptors: *Soil water movement, Soil water, *Moisture uptake, *Alfalfa, *Soil-water plant relationships, Root zone, Xylem, Soil profiles, Moisture stress.

Soil water uptake by alfalfa (Medicago sativa L.) was studied by monitoring a seed crop with a neutron moisture probe. Plant water potential measurements support passive uptake. Water was withdrawn in the lower root zone, where soil matric potentials were between -7 and -10 bars, while the upper portion of the profile was above -2 bars. Results indicate that passive water uptake requires large water potential differences between the root xylem and soil in the moist upper portion of the profile. Alfalfa plant moisture potentials decreased through the growing season, possibly due to moisture stress and maturity. While water is preferentially taken up from layers where the soil water potential is high, it continues being withdrawn from layers of lower potential. Root location (shallow or deep) does not appear to influence water uptake. (Jahns-Arizona)
W76-11504

DROUGHT RESISTANCE CHARACTERISTICS OF BLUE GRAMA SEEDLINGS,
Agricultural Research Service, Fort Collins, Colo.
For primary bibliographic entry see Field 2I.
W76-11505

NITROGEN-SILICON INTERACTION IN PLANTS GROWN IN DESERT SOIL WITH NITROGEN DEFICIENCY,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
A. Wallace, E. M. Romney, and R. T. Mueller.
Agronomy Journal, Vol. 68, No. 3, p 529-30, May-June 1976. 5 tab, 7 ref.

Descriptors: *Nitrogen, *Plant growth, *Fertilizers, *Range grasses, *Barley, Fertility, Arid lands, Beans, Calcareous soils, Soil dynamics, Deficient elements, Cations, Anions, Soil moisture, Sierozems.
Identifiers: *Silicon, Ion competition.

Comparisons were made for the yield and nutrient status of native range grass (Hilaria rigida), barley (Hordeum vulgare L. 'Atlas 57') and bush beans (Phaseolus vulgaris) grown in a glasshouse in soils from shrub and bare desert areas. The latter two plants were grown with and without added N fertilizer. The relationship of N to other anions was studied to determine the nutrient relationships in desert soil infertility even with N supplied. Plants grown in the infertile soil had greatly decreased yields and slightly lower total cation concentrations, were low in N and usually had greater Si concentrations. Nitrogen fertilizer caused only a slight yield improvement in infertile soils but increased N and reduced Si in the plants. Barley yields were much greater on shrub-area soils than bare-area ones, and added N fertilizer did little to overcome the suppressed yield from the latter soil. Similar results were obtained with bush bean. The Si appeared to enter the plant's cation-anion balance. (Jahns-Arizona)
W76-11509

MANAGEMENT OF WATER RESOURCES UNDER DIFFERENT SOCIO-ECONOMIC CONDITIONS,
Arizona University, Tucson, Committee on Arid Lands Resources.
For primary bibliographic entry see Field 6B.
W76-11514

EFFECTS OF IRRIGATION REGIMES, PLANTING DATES, NITROGEN LEVELS, AND ROW SPACING ON SAFFLOWER CULTIVARS,
Agricultural Research Service, Phoenix, Ariz.
G. H. Abel.
Agronomy Journal, Vol. 68, No. 3, p 448-451, May-June 1976. 8 tab, 7 ref.

Descriptors: *Irrigation effects, *Planting management, *Nitrogen, *Fertilization, *Crop response, Irrigation efficiency, Crop production, Arid lands, Arizona, Water management(Applied), Water conservation.
Identifiers: *Safflower.

In three experiments on safflower (Carthamus tinctarius L.) cultivars over a 3-year period, seed yields were greater in the last two years with crops planted on December 15 than those planted February 15. Plants in two-row plots produced fewer seeds/head and smaller seeds than those in one-row plots, but increased populations in the former group compensated for such deficiencies and the yields were comparable. An irrigation regime involving early cut-off conserved water and labor, reduced weed growth and produced optimum seed yields at lower levels of nitrogen fertilization. The best fertilization levels were from 84 to 336 kg/ha, according to the planting date, irrigation regime and cultivar. For the Laveen clay loam soil at the test site (Mesa, Arizona), 168 kg/ha was optimum for a December planting; quantities exceeding 84 kg/ha had no yield advantage with a February planting. The 'Dart' cultivar outyielded all others used, especially when given the optimum fertilization and irrigation treatment. (Jahns-Arizona)
W76-11515

FERTILIZING DRYLAND GRAIN SORGHUM ON UPLAND SOILS THE 20- TO 26- INCH RAINFALL AREA IN KANSAS,
Kansas State Univ., Hays. Fort Hays Branch Experiment Station.
C. A. Thompson.
Kansas Bulletin No. 579, Kansas Agricultural Experiment Station Kansas State Univ., Manhattan, 1975. 20 p. 6 fig, 11 tab.

Descriptors: *Fertilization, *Crop response, *Grain sorghum, *Dry farming, *Kansas, Nitrogen, Soil moisture, Stubble mulching, Phosphorus, Soil-water-plant relationships, Water utilization.

The results are presented of 227 dryland grain sorghum fertility experiments conducted on 58 upland sites in Kansas from 1964 to 1972. The study area was characterized by average yearly rainfall of 20 to 26 inches and had been unirrigated. Nitrogen had the greatest positive effect on grain yields, with 72% of the sites responding. The dryland sorghum did not respond satisfactorily to potassium, sulfur, zinc, iron, manganese or copper; however, extremely eroded soils or newly established terrace channels may respond to zinc. Response to N improved as the soil moisture increased (up to 92% with more than 54 inches of moist soil). Plots fertilized with N produced yields of up to 10 bu/a more than unfertilized plots as soil moisture increased. Yield increases were small when the quantity of moist soil was less than 36 inches. Stored moisture may be improved by stubble mulch farming, minimum tillage, till-plant systems and combinations of chemical tillage. Water-use efficiency is also enhanced by increased soil moisture (2.33 bu/in water at low soil moisture to 3.35 bu/in water at higher levels). Efficient N use and expected yield rates are discussed, along with soil phosphorus effects. (Jahns-Arizona)
W76-11516

NITROGEN FLUX INTO CORN ROOTS AS INFLUENCED BY SHOOT REQUIREMENT,
Agricultural Research Service, Byron, Ga.
J. H. Edwards, and S. A. Barber.
Agronomy Journal, Vol. 68, No. 3, p 471-473, May-June 1976. 3 tab, 8 ref.

Descriptors: *Nitrogen, *Fertilization, *Nutrient requirements, *Corn(Field), *Root systems, Planting management, Plant growth, Absorption.
Identifiers: Root-trimming, Root splitting.

Experiments were conducted to determine the influence of shoot N requirement on N influx/m of corn roots. Trimmed- and split-root procedures were used for solution culture experiments in the growth chamber to vary the N absorbing roots/unit of shoot and assess the impact on N influx. Roots trimmed 2 days before influx measurement had slight increases in the N influx/m of root, causing reduced N uptake/plant. Roots split between N-containing and N-free solutions from seedling stage until influx measurement at 16 or 18 days had greater increases in net N influx than trimmed roots had. Both experiments revealed no relation between N level within the root and N uptake rate/m of root. Increased shoot demand for N does not immediately affect N influx into the root, but N stress causes an increased influx capability. Plants developing throughout their growth cycle with N restricted to part of the root system may absorb N more rapidly through those localized roots exposed to N than when N is placed into the localized portion of soil after several weeks' growth. (Jahns-Arizona)
W76-11519

DRYLAND CROPPING SEQUENCES WITHIN A TALL WHEATGRASS BARRIER SYSTEM,
Agricultural Research Service, Sidney, Mont.
A. L. Black, and F. H. Siddoway.
Journal of Soil and Water Conservation, Vol. 31, No. 3, p 101-105, May-June 1976. 4 tab, 1 fig, 9 ref.

Descriptors: *Dry farming, *Farm management, *Wheat grasses, *Erosion control, Wind erosion, Soil water, Excess water, Recharge, Crop production, Fallowing, Water utilization, Encroachment, Water yield.
Identifiers: *Intensive cropping.

A tall wheatgrass (Agropyron elongatum 'Alkar') barrier system designed to control wind erosion and to collect and hold snow overwinter was studied for 8 years to determine if increased soil water recharge can support more intensive cropping than crop-fallow rotations. This system reduces the fallow acreage and thereby the risk of continued salinization problems. Compared with unprotected land, barriers almost doubled overwinter soil water storage the first 9 months. With nitrogen and phosphorus fertilization, average annual grain yields were 30 to 69% greater for intensive cropping systems than for conventional spring wheat-fallow. The continuous cropping system used 71 to 80% of the average precipitation between harvests, while conventional spring wheat-fallow used only 30%. Production efficiency per inch of water used was three times greater for annual cropping systems, consisting mainly of winter wheat and safflower, than for spring wheat-fallow; total grain production per acre unit of precipitation received can also be increased. Unused water between crops, which was much greater for spring wheat-fallow, may contribute to saline seeps. (Jahns-Arizona)
W76-11521

STUDIES ON THE IMPROVEMENT EFFECT OF WASTE LIQUOR FROM PULP MILLS FOR THE SOILS: I. THE VEGETATION EXPERIMENTS WITH SOYBEANS AND CORN, (IN JAPANESE),
Shimane Univ., Matsue (Japan). Faculty of Agriculture.
For primary bibliographic entry see Field 5E.
W76-11563

MITES ON SOYBEANS: MOISTURE AND TEMPERATURE RELATIONS,
Cornell Univ., Ithaca, N. Y. Dept. of Entomology and Limnology.
K. W. Simpson, and W. A. Connell.
Environ Entomol. 2(3), p 319-323, 1973.

Descriptors: *Mites, *Soybeans, Rainfall, *Moisture, *Temperature, Correlation analysis, Climatology.
Identifiers: Tetranychus-Turkestani.

Computer analysis of population data for mites, predominantly Tetranychus turkestani Ugarov and Nikolski, in 8 soybean fields during a 7-yr period showed a significant correlation with both rainfall and maximum temperature. Rainfall accounted for 51.3% and average maximum temperature for 25.3% of the population variation. Climatological conditions during Aug. appeared most important. Correlation of rainfall totals with mite population for each of the mo. June through Sept. indicated that Aug. rainfall was most influential. Moreover, of the monthly average maximum temperatures only those of Aug. were significantly related to peaks of mite abundance. Measurement of soybean leaf temperatures for 2 wk with electrical monitoring equipment showed that T. turkestani lives under temperature conditions that can fluctuate widely within short periods.--Copyright 1973, Biological Abstracts, Inc.
W76-11604

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

COLLECTED REPRINTS, VOLUME III: 1971-1974,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W76-11103

HYDROLOGIC ASPECTS OF FLOOD MANAGEMENT IN THE CHEMUNG RIVER BASIN,
Cornell Univ., Ithaca, N. Y. School of Civil and Environmental Engineering.
For primary bibliographic entry see Field 2E.
W76-11106

VEGETATION MAPPING IN LAKE CHAMPLAIN WETLANDS,
Vermont Univ., Burlington. Dept. of Geography.
A. O. Lind, and W. G. Howland.
Available from the National Technical Information Service Springfield, Va as PB-256 207, $4.00 in paper copy, $3.00 in microfiche. Vermont Water Resources Research Center, Burlington, July 1975. 28 p, 5 fig, 3 tab, 9 ref. OWRT A-022-Vt(1).

Descriptors: *Mapping, Remote sensing, *Vegetation, *Wetlands, Lakes, *Vermont, *Aerial photography, Canopy, *Classification, Methodology, Deltas, Rivers.
Identifiers: *Lake Champlain(Vt), Missiquoi River delta(Vt), Lamoille River delta(Vt).

Detailed canopy vegetation maps at a scale of 1:20,000 have been produced for two major wetlands in the Missisquoi and Lamoille River Deltas of the Lake Champlain Basin, based on the interpretation of medium-high altitude color aerial photography. Photo interpretation was visual through use of a Bausch and Lomb Zoom 240 stereoscope. Signatures were established for a classification of thirteen canopy types. Species composition, relative dominance, canopy height and other characteristics of canopy associations are discussed. Ground control was achieved in summer of 1975 through a rigorous program of field survey. Methodology is carefully outlined for future studies of a comparative nature.
W76-11111

LAND PRICES IN FLOOD HAZARD AREAS: APPLYING METHODS OF LAND VALUE ANALYSIS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6F.
W76-11112

INTERACTIONS BETWEEN LAND USE AND URBAN WATER RESOURCES PLANNING,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
J. W. Delleur, W. L. Miller, and H. R. Potter.
Water Resources Bulletin, Vol. 12, No. 4, p 759-777, August, 1976. 4 tab, 31 ref.

Descriptors: *Water resources, *Planning, *Land use, *Control, Population, Growth rate, Prices, Income, Urbanization, Mathematical models, Simulation analysis, Assessment, Alternative planning, Recreation, Aesthetics, Economics, Research priorities.
Identifiers: Consumer behavior, Preferences.

The patterns of land use and their relationship to urban water resources are examined from the point of view of population growth, consumer behavior, and preferences of price, income, and land use controls. The changes that need to be made in present social attitudes or water resources laws to satisfy the desired new developments are examined. Several implementation methods that are feasible and effective for changing urban development patterns are considered as well as models for assessing alternate development plans. The needs for research are outlined. It is concluded that very few projects look at the global interactions of patterns of urban development and urban water resources. The need is for a generalized systems analysis which integrates the urban planning process while promoting environmental quality and includes the feedback of the environmental impacts on the planning activities. (Bell-Cornell)
W76-11130

LOCAL ATTITUDES AND WATER RESOURCES DEVELOPMENT: A CANADIAN CASE STUDY,
Prince Edward Island, Charlottetown. Dept. of Sociology and Anthropology.
For primary bibliographic entry see Field 6B.
W76-11132

OPTIMIZATION OF WATER DISTRIBUTION NETWORK SYSTEMS,
Weston (Roy F.), Inc., West Chester, Pa.
For primary bibliographic entry see Field 8B.
W76-11133

ESTIMATING FLOW CONDITIONS FOR RIVER MODELS,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 5B.
W76-11136

MULTI-CRITERION RANKING OF ALTERNATIVE LONG-RANGE WATER RESOURCE SYSTEMS,
National Water Authority, Budapest, Hungary. Dept. of Water Management Policy.
For primary bibliographic entry see Field 6B.
W76-11139

ESTIMATED COSTS OF MECHANICAL CONTROL OF WATER HYACINTHS,
Georgia Univ., Athens. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5G.
W76-11141

A STOCHASTIC PROGRAMMING MODEL APPLIED TO WATER RESOURCES MANAGEMENT,
Computing Center for Universities, Budapest (Hungary).
J. Pinter.
ESZK II, (Egyetemi Szamitokozpont), Computing Center for Universities, Budapest, Hungary, 65 p, August 1975. 2 fig, 7 tab, 37 ref.

Descriptors: Water resources, *Management, *Stochastic processes, *Mathematical models, *Planning, *Reservoirs, *Low-flow augmentation, Optimization, Water quality, Design, Evaluation, Computers, Equations, Systems analysis, Economics.
Identifiers: *Hungary, *Cost minimization, Random search procedure, Flow-rate equalization, Water quantity.

Hungary has a rather changeable water supply situation, suffering periodically from the danger of inundation and the occurrence of water shortage; this has led to the conception of constructing storage reservoirs. Beside the agricultural needs, there exists a strong tendency toward the grow of industrial demands. This paper considers the problem of water resources management in an industrialized area of Hungary, the Sajo-region. A mathematical model is presented for planning a system of reservoirs for the purpose of low-flow augmentation. The computational solution to this problem is detailed, in connection with which a random search optimization procedure is presented. Finally, a possible comprehensive model of water resources management is designed, considering both quality and quantity aspects. (Bell-Cornell)
W76-11144

INTEGRATED CONTROL OF ALLIGATOR WEED AND WATER HYACINTH IN TEXAS.
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 5G.
W76-11145

AQUATIC PLANT CONTROL PROGRAM FOR ALLIGATOR WEED AND WATER HYACINTH IN TEXAS,
Texas Parks and Wildlife Dept. Houston.
For primary bibliographic entry see Field 5G.
W76-11147

NEW TECHNIQUES IN VEGETATION MAINTENANCE ON MILITARY RESERVATIONS,
Stull Chemical Co., San Antonio, Tex.
For primary bibliographic entry see Field 5G.
W76-11149

HERBICIDES AS ANTIPOLLUTANTS,
Agricultural Research Service, Laramie, Wyo. Crops Research Div.
For primary bibliographic entry see Field 5G.
W76-11150

AQUATIC PLANT CONTROL PROBLEMS AT SAM RAYBURN RESERVOIR,
Army Engineer District, Fort Worth, Tex.
For primary bibliographic entry see Field 5G.
W76-11152

MULTIPLE OBJECTIVE PLANNING FOR WATER RESOURCES, (VOL I),
Idaho Research Foundation, Inc. Moscow.
For primary bibliographic entry see Field 6B.
W76-11173

MULTIPLE OBJECTIVE PLANNING FOR WATER RESOURCES, (VOLUME II),
Idaho Research Foundation, Inc., Moscow.
For primary bibliographic entry see Field 6B.
W76-11174

PRELIMINARY INVESTIGATIONS OF A HEADWATER CREEK IN EASTERN KENTUCKY,
Virginia Commonwealth Univ., Richmond. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W76-11284

WATER QUALITY MODEL OF THE LOWER FOX RIVER, WISCONSIN,
Environmental Protection Agency, Anchorage, Alaska. Alaska Operations Office.
For primary bibliographic entry see Field 5B.
W76-11316

EVALUATION OF PRIOR APPROPRIATION IN MISSISSIPPI,
Mississippi State Univ., Mississippi State. Water Resource Research Inst.
For primary bibliographic entry see Field 6E.
W76-11336

AN EVALUATION OF PUBLIC HEARINGS ON WATER DEVELOPMENT PROJECTS IN MISSISSIPPI,
Mississippi State Univ., Mississippi State. Social Science Research Center.
For primary bibliographic entry see Field 6B.
W76-11337

ESTABLISHING INSTREAM FLOWS: ANALYSIS OF THE POLICY-MAKING PROCESS IN THE PACIFIC NORTHWEST,
Washington State Univ., Pullman. Dept. of Political Science.
For primary bibliographic entry see Field 6B.
W76-11339

FLOOD PLAIN INFORMATION: KASKASKIA RIVER, BEAR CREEK, LAKE FORK CREEK, WEST FORK CREEK AND 'A' CREEK, DOUGLAS COUNTY, ILLINOIS, NO. 1.
Army Engineer District, St. Louis, Mo.
Prepared by Homer L. Chastain and Associates, Decatur, Illinois, for the County of Douglas, Illinois, February 1974. 36 p, 10 fig, 20 plates, 4 tab.

Descriptors: *Floods, *Flood stages, *Flow characteristics, *Flood plains, *Flood profiles, Flood flow, Flood data, Peak discharge, Channels, Channel improvement, Runoff, *Illinois.
Identifiers: *Kaskaskia River(IL), Bear Creek(IL), Lake Fork Creek(IL), West Fork Creek(IL), 'A' Creek(IL), Douglas County(IL), Chesterville(IL), Standard Project Flood, Intermediate Regional Flood, Flood plain management program.

Kaskaskia River, a tributary of the Mississippi River, flows through rolling, cultivated farmland in this study reach for 8.7 miles from its confluence with Lake Fork Creek to the Douglas - Coles County line. It falls .8 feet per mile. Its tributaries, Bear Creek, Lake Fork Creek, West Fork Creek, and 'A' Creek vary in slope from 1.9 to 3.5 feet per mile. Bear Creek and West Fork Creek consist partly of man-made improved channels, while the other two creeks are more meandering. Except for a small commercial development in Chesterville (IL), the flood plains, which vary from 1700 to 10,000 feet wide on the river and 400 to 7,000 feet on the creeks, are predominantly woods or farm lands. Floods occur during all seasons, particularly in the spring resulting from thunderstorms coupled with preceding periods of prolonged rainfall. Water stages rise quickly, usually within 8 hours, to flood levels. Natural obstructions and many of the 25 bridges over the river obstruct flood flows. The only flood damage reduction measures have been channel improvements on Bear, West Fork and 'A' Creeks. The highest recorded flood occurred in May 1943 when Lake Fork was reported as being the highest in 30 years and crops were washed out. Estimated peak discharges for an Intermediate Regional Flood and Standard Project Flood are 18,970 cubic feet per second and 53,530 cfs respectively at Douglas - Coles County line, and would inundate much of the flood plain. Channel velocities in the Kaskaskia River would vary between 1 and 6 ft/sec in an IRF, and would be slightly higher in an SPF. (Salzman-North Carolina)
W76-11341

FLOOD PLAIN INFORMATION: LAKE MONROE, NEAR SANFORD, FLORIDA.
Army Engineer District, Jacksonville, Fla.
Prepared for the City of Sanford and the Board of County Commissioners of Seminole County, July 1971. 25 p, 4 fig, 10 plates, 2 tab.

Descriptors: *Flood plains, *Floods, *Flow duration, *Flood profiles, Dams, Channel improvement, Storms, Flood data, Historic floods, Flood frequency, Erosion, Flood peak, Non-structural alternatives, Zoning, Flow characteristics, *Florida.
Identifiers: *Lake Monroe(FL), Sanford(FL), Seminole County(FL), St. Johns River(FL), Intermediate Regional Flood, Standard Project Flood.

Lake Monroe is one of the larger lake components of the St. Johns River. The lake is 6 miles long, 4 miles wide and usually about 7 feet deep. This report is concerned with about 6 miles of the south shore. Sanford occupies a 2 mile reach of this shore which has flood plains extending 300 to 3,500 feet inland. The watershed above Sanford is 2,400 square miles of flat, poorly drained land. In the flood plain within Sanford are motels, commercial and government buildings, residences, utilities, and streets. Flooding occurs in late summer and early fall as the result of above normal rainfall. Local thunderstorms, over a period of several days and/or tropical storms can contribute to this rainfall. Damage from floods will occur when stages exceed 7 feet above mean sea level. Floods of this magnitude have occurred 9 times since 1920, the largest occuring in 1953 when flood stage reached 8.5 ft msl. Losses were $250,000. The Intermediate Regional Flood and the Standard Project Flood would reach 9.3 and 10.5 ft msl, respectively. Large floods would rise at a rate of about 3 inches per day, and remain at or near peak stage for as much as 10 days to a month or more. Small reductions in flood stages and duration of flooding on Lake Monroe will occur when construction of the upper St. Johns River Project of the Central and South Florida Flood Control Project is completed. A concrete retaining wall built along part of the shoreline of the lake provides protection against erosion caused by wave action, but not against flooding since the top of the wall is below 7 ft. Local building and zoning regulations are used to regulate construction in flood prone areas. (Henley-North Carolina)
W76-11342

FLOOD PLAIN INFORMATION: NORTHEAST VOLUSIA COUNTY, FLORIDA.
Army Engineer District, Jacksonville, Fla.
Prepared for the Board of County Commissioners of Volusia County, July 1971. 27 p, 10 fig, 16 plates, 3 tab.

Descriptors: *Storms, *Floods, *Tides, *Flood profiles, *Flood plains, *Hurricanes, Control structures, Flood stages, Flood duration, Erosion, Flood peak, Estuaries, Shores, Historic floods, Flood recurrence interval, Flood data, Flood frequency, *Florida.
Identifiers: Volusia County(FL), Daytona Beach(FL), Ormond Beach(FL), Holly Hill(FL), South Daytona(FL), Port Orange(FL), Halifax River(FL), Tomoka River(FL), Spruce Creek(FL), Hurricane parameters, Runup, Stan-

dard Project Tidal Flood, Intermediate Regional Tidal Flood.

This report covers an urbanized area of about 130 square miles with a population of 80,000. It includes the cities of Daytona Beach, Ormond Beach, Holly Hill, South Daytona, and Port Orange. The Halifax River and its tributaries, Tomoka River and Spruce Creek, drain the area. Many small bridges and culverts, as well as insufficient capacities of drainage systems, can adversely affect flood plains. Flooding occurs after intense rainfall and high tides from occassional hurricanes. A hurricane has passed within 50 miles of Daytona Beach once every 9 years since 1900 and high tides have damaged urban development 3 times during that period. During a 1950 tropical storm 8 foot elevations were reached on the Halifax River. During an Intermediate Regional Tidal Flood, waters would reach 7 to 8.5 feet in the Halifax River and combined tide and runup could reach 16 feet along the ocean front. Standard Project Tidal Floods would reach 8 to 10 feet on the Halifax River and 20 feet along the ocean front. Maximum elevations would normally be reached 4 to 6 hours after the onset of hurricane winds and would affect 8,000 acres of urban land. Low bulkheading along the Halifax River and a fairly extensive canal system serve as some protection against floods. (Henley-North Carolina)
W76-11343

FLOOD PLAIN INFORMATION: SWIFT CREEK, MACON AND BIBB COUNTY, GEORGIA.
Army Engineer District, Savannah, Ga.
Prepared for the City of Macon and Bibb County, Georgia, June 1973. 30 p, 11 fig, 13 plates, 6 tab.

Descriptors: *Floods, *Flood plains, *Flood profiles, *Flood forecasting, *Flood stages, Flow duration, Flood flow, Storms, Hurricanes, Historic floods, Flood peak, Flow characteristics, Flood plain zoning, Warning systems, Obstructions to flow, *Georgia.
Identifiers: Macon(GA), Bibb County(GA), Swift Creek(GA), *Flood plain management, Ocmulgee River(GA), Jones County(GA), Intermediate Regional Flood, Standard Project Flood.

The study area encompasses about 11 square miles of Swift Creek watershed which lies in eastern Bibb and southern Jones Counties. Located near the City of Macon, Swift Creek is a tributary of Ocmulgee River and has narrow flood plains which are experiencing rapid commercial and industrial development along the highways and two railroads in the study area. Residential development is also occurring on the flood plain. Obstructions to flood flows include dams, some of the 9 bridges over Swift Creek, buildings, and vegetation. The City of Macon and Bibb County enacted flood plain zoning ordinances and are served by a flood warning system maintained by the National Weather Service and the local Civil Defense Office. Flooding can occur in any season and can result from general rainstorms, thunderstorms and hurricanes. Five large floods have occurred since 1916, the largest occurring in 1948 when a peak discharge of 83,500 cubic feet per second was reached on Ocmulgee River. The Intermediate Regional Flood and Standard Project Flood would have a peak discharge of 4,740 and 11,850 cfs, respectively, on Swift Creek. The IRF would typically rise 15 feet in 6 hours and remain above bankfull for 12 hours. Channel velocities could reach 10 ft/sec. Nine houses, 2 business establishments, roads, and utilities are within the 460 acres which would be flooded during an IRF. During the SPF 540 acres would be flooded. (Henley-North Carolina)
W76-11344

FLOOD PLAIN INFORMATION: WAYCROSS DRAINAGE CANAL, WAYCROSS AND WARE COUNTY, GEORGIA.
Army Engineer District, Savannah, Ga.
Prepared for Waycross and Ware County, Georgia, June 1969. 56 p, 36 fig, 22 plates, 17 tab.

Descriptors: *Canals, Floods, *Flood plains, Channels, *Flood profiles, Flow characteristics, *Flood forecasting, *Flood peak, Warning systems, Channel improvement, Flood stages, Historic floods, Storms, Hurricanes, Obstructions to flow, *Georgia.
Identifiers: *Waycross Drainage Canal(GA), Waycross(GA), Ware County(GA), Satilla River(GA), Intermediate Regional Flood, Standard Project Flood.

A tributary of the Satilla River, the Waycross Drainage Canal (with drainage area of 14.5 square miles) drains most of the city of Waycross in Ware County. Information on a 4.2 mile reach of Waycross Drainage Canal and on four tributaries which have a combined reach length of 3.2 miles is presented. Waycross Drainage Canal has a well defined channel and is surrounded by flat terrain. When flows exceed channel capacity, considerable development is subject to flooding. The entire flood plain is extensively developed with residential buildings, businesses, industry and commercial buildings. Vegetation and 33 bridges would obstruct flood flows of the Intermediate Regional Flood. The IRF would flood 450 buildings and 400 acres. Peak discharge would reach 1,510 cubic feet per second at the gage at City Boulevard with channel and overbank velocitie of 8 and 4 feet per second in the canal. IRF can be expected to rise 8 feet in 12 hours and remain above bankfull for 16 hours. The Standard Project Flood would flood 930 buildings and 810 acres. Peak discharge would reach 8,420 cfs with channel and overbank velocities of 10 and 5 feet per second respectively. SPF can be expected to rise 18 feet in 14 hours and remain above bankfull for 20 hours. The area is subject to general rainfloods and floods resulting from hurricanes. Building permits are required for all new construction, but Waycross and Ware County need flood plain regulations. (Henley-North Carolina)
W76-11345

FLOOD PLAIN INFORMATION: BUCK CREEK AND GRASSY CREEK, MARION COUNTY, INDIANA,
Army Engineer District, Louiville, Ky.
Prepared for Marion County Metropolitan Planning Department and Indianapolis Flood Control District, June 1973. 31 p, 14 fig, 11 plates, 7 tab.

Descriptors: Floods, *Historic floods, *Flood data, Flood stages, Flow characteristics, *Flood plains, *Flood protection, *Non-structural alternatives, Planning, Peak discharge, Flow duration, Flood plain zoning, Flash floods, *Indiana.
Identifiers: Buck Creek(IN), Grassy Creek(IN), Marion County(IN), Intermediate Regional Flood, Standard Project Flood, Cumberland(IN), Acton(IN), Subdivision regulations, Indianapolis(IN).

The study reach of this report includes 101 sq mi drained by Buck Creek on the east side of Indianapolis (IN) and 18.79 sq mi drained by Grassy Creek on the west side of Buck Creek. Both streams flow in a southerly direction with an average slope of 5.25 ft/mi. Their flood plains consist primarily of cropland and undeveloped land although development pressures are increasing. The 1970 population of Warren was 86,000 and is expected to reach 110,000 by 1980. Main flood season occurs January through April resulting from heavy rains; however, intense local storms can cause flash flooding. Channel velocities can range up to 15 ft/sec. Floods are generally short, lasting no longer than 48 hours. No flood control projects exist. Some channel improvement has been undertaken. A county-wide flood plain zoning ordinance regulates all construction in flood plains. Presently 24 bridges and natural vegetation obstruct the flood flow. Compared to the greatest known flood which occurred in May 1956 discharging 16,800 cubic feet per second on Buck Creek and 5,100 cfs on Grassy Creek, an Intermediate Regional Flood and a Standard Project Flood would have peak discharges of 21,000 cfs and 32,000 cfs respectively on Buck Creek. In an IRF a peak discharge of 5,800 cfs is predicted on Grassy Creek. (Salzman - North Carolina)
W76-11346

FLOOD PLAIN INFORMATION: KENAI RIVER, PHASE II, KENAI PENINSULA BOROUGH, ALASKA,
Army Engineer District, Anchorage, Alaska.
Prepared for the Kenai Peninsula Borough, Alaska, June 1975. 25 p, 12 fig, 18 plates, 3 tab.

Descriptors: Floods, *Flood flow, *Flood forecasting, *Flood profiles, Flood stages, *Ice jams, *Alaska, *Flood plains, Storms, Historic floods, Flood data, Flood frequency, Peak discharge, Stream erosion, Glaciation, Warning systems, Obstructions to flow, Runoff.
Identifiers: Kenai Peninsula Borough(AK), *Kenai River(AK), Jokulhlaup, Killey River(AK), Moose River(AK), Standard Project Flood, Intermediate Regional Flood.

'The portion of Kenai River included in this study extends from Moose River at Sterling, approximately ten miles upstream from the confluence with the Killey River, to the Moose Range boundary' and has a drainage area of 49 square miles. Most of the area is wilderness but there is ongoing residential and recreational development, and greatly increased development is expected. Obstructions to flood flows include vegetation, ice jams, docks and gravel pads extending into the river. Flooding can result from conventional storms runoff in summer and fall, the sudden release of glacier dammed waters (a phenomenon called a jokulhlaup), and spring ice jams and rapid snowmelts. Moderate damage was incurred during a flood in September, 1974, which reached a height of 184.2 feet and had a peak discharge of 26,800 cubic feet per second at Soldotna. An Intermediate Regional Flood will reach a height of 185.5 feet, have a peak discharge of 37,500 cfs at Soldotna and have channel velocities of 6.3 ft and overbank velocities of 3 ft. A Standard Project Flood will reach a height of 188.4 ft, have a peak discharge of 62,000 cfs, and have channel velocities of 7.2 ft. Flood flows cover only a small amount of overbank area with runoff from large storms modified by the regulating effects of Kenai Lake, Skilak Lake and lesser lakes and swamps in the watershed. Thus IRF and SPF discharges will create lower levels of flooding than ice jam created backwaters occuring under substantially smaller flows. Damage from IRF and SPF will effect residential and recreational development and agricultural land. There is a flood warning system in the area. (See also W74-01952) (Henley - North Carolina)
W76-11347

FLOOD PLAIN INFORMATION: FISHER CREEK, SANTA CLARA COUNTY, CALIFORNIA,
Army Engineer District, San Francisco, Calif.
Prepared for Santa Clara County Flood Control and Water District, July 1973. 18 p, 6 fig, 9 plates, 6 tab.

Descriptors: *Floods, *Flood forecasting, *Flood profiles, *Flood plains, Obstructions to flow, *California, Runoff, Overland flow, Streamflow forecasting, Historic floods, Flood data, Flood frequency, Peak discharge, Flood peak, Flow duration, Flood damage, Levees, Dikes, Reservoirs, Channel improvement.
Identifiers: *Fisher Creek(CA), Santa Clara County(CA), Coyote Creek(CA), Intermediate Regional Flood, Standard Project Flood.

The properties in the flood plain are primarily agriculture and were inundated by the flood of 1955. Open spaces in the plain are already being subjected to pressure for development. The only industrial development is a mushroom plant. About 13.8 sq mi of an 18.3 sq mi basin contribute to basin runoff in the study area. The flat, alluvial valley through which the creek flows is poorly drained and partially depressed. The main flood season for Fisher Creek, a tributary of Coyote Creek, extends from October through April when flooding may be caused by intense rainfalls. A streamflow gage has been in operation on Fisher Creek for thirty years, with records revised in light of reservoir constructions in 1936 and 1950. During the 1955 flood 480 acres were flooded and $98,000 damage resulted. In the event of an Intermediate Regional Flood (IRF) peak flows of from 600 to 2300 cfs may be expected and in a Standard Project Flood (SPF) peak flows of up to 10,000 cfs are forecasted. The 1955 flood reached an elevation of 240.0 feet and in comparison 246.5 feet and 253.5 feet may be expected for the IRF and SPF respectively. These great floods would be expected to rise in 6.5 hours for the IRF with a flood stage duration of 13 hours and for an SPF a rise of 2.3 hours with flood stage duration of 38 hours. All of the bridges and culverts in the study area are obstructive to flow at the discharges that could be expected to accompany an IRF. Tentative plans have been made to improve flow protection of Fisher Creek. Some channel improvement and diking has already been carried out by local interests. (Smith - North Carolina)
W76-11348

FLOOD PLAIN INFORMATION: ALAMITOS CREEK, INCLUDING GUADALUPE CREEK-ARROYO CALERO AND SANTA TERESA CREEK, SANTA CLARA COUNTY, CALIFORNIA,
Army Engineer District, San Francisco, Calif.
Prepared for Santa Clara County, California, July 1973. 22 p, 12 fig, 14 plates, 7 tab.

Descriptors: Floods, *Flood flow, *Flood plains, *Flood stages, Flood protection, Flood forecasting, Flood profiles, Storms, Flood data, Flood frequency, Peak discharge, Flow characteristics, Erosion, Obstructions to flow, Reservoirs, *California.
Identifiers: Santa Clara County(CA), New Almaden(CA), *Alamitos Creek(CA), San Jose(CA), Guadalupe Creek(CA), Santa Teresa Creek(CA), Calero Creek(CA), Standard Project Flood, Intermediate Regional Flood.

Flooding along these creeks, with a total drainage area of 53 square miles, has historically caused damage to agricultural areas and urban development in the flood plains. Twelve damaging floods have occurred since 1930 when streamgages were installed on several of the creeks. The most significant flood, in April 1958, had a peak discharge of 4500 cubic feet per second and reached a gage height of 246.9 feet. An Intermediate Regional Flood would have a peak discharge of 6,400 cfs, reach a height of 250.4 feet, and have channel velocities up to 17 ft/sec and overbank velocities up to 4 ft/sec. A Standard Project Flood would have a peak discharge of 9,400 cfs and reach a height of 251.6 feet. An IRF would result in the inundation of residential and commercial establishments in New Almaden and San Jose. Floods rise to peak in less than 10 hours and remain at critical stage less than 1 day. The flood season is from October to April when floods result from intense rainstorms. Vegetation and many of the 36 bridges and culverts can obstruct flood flows. Three reservoirs in the area can limit the effects of flood waters. The Santa Clara County Flood Control and Water District has an Emergency Operations Center which coordinates flood warning and emergency activities. (Henley - North Carolina)
W76-11349

FLOOD PLAIN INFORMATION: DEER CREEK AND WHITE RIVER, EARLIMART, CALIFORNIA,
Army Engineer District, Sacramento, Calif.
Prepared for Tulare County, California, June 1971. 44 p, 26 fig, 32 plates, 7 tab.

Descriptors: *Flood stages, *Flood profiles, *Flood damage, Flood forecasting, *Flood plain zoning, Floods, Flood flow, Storms, Historic floods, Flood frequency, Peak discharge, Erosion, Flow duration, Deposition, Flood plains, Warning systems, Levees, Reservoirs, *California, Canals.
Identifiers: Earlimart(CA), Tulare County(CA), *Deer Creek(CA), *White River(CA), Standard Project Flood, Intermediate Regional Flood, Pixley(CA).

The portions of Deer Creek and White River covered in this report extend some 20 miles from State Highway 99 upstream to about the foothill line and have a drainage area of 470 square miles. Development in the area is largely agricultural with limited residential development around Earlimart and Pixley. Current population in the area is 4500. Vegetation, levees built by local landowners, 32 bridges and culverts, and the Friant-Kern Canal can obstruct flood flows. Tulare County has adopted a flood plain ordinance providing for secondary and primary floodways. There is an emergency warning system. Floods occur in November through March after exceptionally heavy rains. Historically they have caused heavy damage to orchards, farmland and irrigation systems. Damage resulting from the January 1969 flood was estimated at $1.5 million. An Intermediate Regional Flood would have a peak discharge of 14,000 cubic feet per second on Deer Creek and 7,800 cfs on White River, and have channel velocities reaching 9 to 12 feet per second and overbank flows of 2 to 4 ft/sec causing severe bank erosion. A Standard Project Flood would have a peak discharge of 20,000 cfs on Deer Creek and 10,200 cfs on White River. Floods can be expected to rise in .5 to 1 day and last from 1 to 3 days. (Henley - North Carolina)
W76-11350

FLOOD PLAIN INFORMATION: GREEN VALLEY, DAN WILSON, AND SUISUN CREEKS, CORDELIA, CALIFORNIA.
Army Engineer District, Sacramento, Calif.
Prepared for Solano County, June 1972. 38 p, 18 fig, 16 plates, 5 tab.

Descriptors: *Floods, *Flood profiles, *Historic floods, *Flood protection, Flood flow, Flood forecasting, Flood data, Winds, Tides, Flood frequency, Peak discharge, Flood peak, Flow duration, Bank erosion, Warning systems, Flood plain zoning, Levee, Channel improvement, *California.
Identifiers: Solano County(CA), Cordelia(CA), Green Valley Creek(CA), Dan Wilson Creek(CA), Suisun Creek(CA), Standard Project Flood, Intermediate Regional Flood.

The portions of Green Valley, Dan Wilson, and Suisun Creeks covered in this report have a drainage area of 76 sq mi located east of Napa, northeast of Valejo and due west of Fairfield in Solano County, CA. The area is largely agricultural (crops, orchards, and vineyards) with sparce commercial and residential development in and around Cordelia and Rockville. Area population is 2,000. The flood season is from November to May, the annual period of most intensive rainfall. Floods have historically been of moderate duration and have been most severe when rainfalls coincide with high tides and strong onshore winds. Since 1937 there have been 11 floods. The most severe occurred in 1955 when peak discharges on Suisun Creek reached 5,000 cubic feet per second resulting in streambank erosion and damage to orchards, croplands and livestock. An Intermediate Regional Flood would have a peak discharge of 6,100 cfs on Suisun Creek with channel velocities of 4-7 ft/sec and overbank velocities of 2-4 ft/sec. This flood would remain at peak for 3-5 hours. A Standard Project Flood would have a peak discharge of 7,200 cfs and last up to 11 hours. Twelve bridges, 6 culverts, 2 golf cart crossings, and vegetation can obstruct flood flows. Three lakes in the drainage area reduce flood levels. Solano County has flood plain regulations and a flood control project (channel improvements and levees) has been completed along 4.5 miles of Green Valley and Dan Wilson Creeks. (Henley - North Carolina)
W76-11351

FLOOD PLAIN INFORMATION: CACHE LA POUDRE RIVER, COLORADO, VOL. III. FORT COLLINS-GREELEY-LARIMER-WELD COUNTY.
Army Engineer District, Omaha, Nebr.
Prepared for Larimer-Weld Regional Planning Commission, October 1975. 43 p, 16 fig, 19 plates, 9 tab.

Descriptors: *Floods, Flow characteristics, *Flood protection, Dams, *Attenuation, Flood stages, Flow duration, Flood plain zoning, Control structures, *Colorado.
Identifiers: *Cache La Poudre River(CO), Fort Collins(CO), Greeley(CO), Flood plain management, Larimer(CO), Weld County(CO), Intermediate Regional Flood, Standard Project Flood, Flooded areas.

Within this 24 mile reach the Cache La Poudre River flows southeasterly through a well-defined channel averaging about 10 feet deep and bordered by relatively flat flood plain of agricultural and wooded areas. Increasing pressure for development is expected especially at upstream and downstream study limits nearest Fort Collins and Greeley respectively. Primary flood season extends from May through September resulting from intense rainfall with snowmelt runoff a factor during May and June. Although no flood control structures exist in the study area, 2 upstream dams on the river have an effect on flood flow. Weld County has also enacted regulations governing development on the flood plain. Larimer County is expected to enact similar flood plain development regulations. The greatest recorded floods near Fort Collins occurred on June 9, 1891, having a peak discharge of 21,000 cubic feet per second and May 21, 1901, with a peak discharge of 12,000 cfs. Considerable flood discharge attenuation occurs along the river as a result of stream diversion dams which supply river water to irrigation canals, and of natural water storage in areas of intermittent depressions and embankments which occur on the flood plain. Tributary streams such as Boxelder Creek contribute to the flood hazard. Serious debris problems during a flood may be caused by trees and vegetation along the banks. An Intermediate Regional Flood and Standard Project Flood would have estimated peak discharges of 17,500 cfs and 41,000 cfs respectively at the upstream limit with 9,000 cfs and 26,400 cfs respectively at the lower study limits. (Salzman - North Carolina)
W76-11352

FLOOD PLAIN INFORMATION: WABASH RIVER, MIAMI COUNTY AND PERU, INDIANA.
Army Engineer District, Louisville, Ky.
Prepared for the Miami County Commissioners, the City of Peru and the Indiana Department of Natural Resources, June 1973. 33 p, 19 fig, 7 plates, 6 tab.

Descriptors: Floods, *Historic floods, *Flood plains, *Flood damage, Non-structural alternatives, *Flood profiles, Runoff, Flood flow, Flood data, Flood stages, Peak discharges, Flow characteristics, Flood protection, Flood plain zoning, *Indiana.

Identifiers: *Wabash River(IN), Miami County(IN), Peru(IN), Standard Project Flood, Intermediate Regional Flood, Flood plain management.

Properties along the river are primarily rural with residential, commercial and industrial development in and adjacent to Peru, a trading and processing center for the surrounding agricultural area. The study reach covers a distance of 13.6 miles with flood plains from 1.2 to 2.5 miles in width. Floods occur during winter and spring resulting from runoff due to intense rainfall. Flood waters in upstream watershed are modified by 3 flood control reservoirs that control 77% of the basin area and reduce likelihood of severe flooding. A flood wall, levees and railroad embankment provide some protection. 'Most of the bridges in the study area are obstructive to the Intermediate Regional Flood and the Standard Project Flood.' Although the 1967 land use plan identifies flood plains to remain undeveloped, the City of Peru does not include flood plain as a land use category which results in conflict of zoning and building permit approvals. The greatest flood occurred on March 26, 1913 when a peak discharge of 115,000 cubic feet per second was recorded and damages exceeded $2 million. Because of the reservoir's detention of water, the peak discharges for an Intermediate Regional Flood (IRF) and Standard Project Flood (SPF) are estimated to be 33,200 cfs and 90,300 cfs, respectively, inundating residential, commercial and agricultural properties. The IRF would crest in about two and a half days and remain above bankfull approximately one day. The SPF would peak in about 5 days remaining out of banks five days. (Salzman - North Carolina).
W76-11353

FLOOD PLAIN INFORMATION: POGUES RUN, PLEASANT RUN, AND BEAN CREEK, MARION COUNTY, INDIANA.
Army Engineer District, Louisville, Ky.
Prepared for Marion County, Metropolitan Planning Department and Indianapolis Flood Control District, September 1970. 47 p, 17 fig, 11 plates, 12 tab.

Descriptors: Floods, *Flood profiles, *Flood data, Flood stages, *Peak discharge, Flow characteristics, *Flood erosion, *Flood plains, *Flood protection, Control structures, Flood flow, Historic floods, Channels, Non-structural alternatives, *Indiana.
Identifiers: Pogues Run(IN), Pleasant Run(IN), Bean Creek(IN), Marion County(IN), Indianapolis(IN), Standard Project Flood, Intermediate Regional Flood.

Pogues Run, with a drainage of 8.87 sq mi, and Pleasant Run, which drains 21.1 sq mi, flow in a southwesterly direction through Indianapolis. Bean Creek, drainage area 5.49 sq mi, flows west and empties into Pleasant Run. The lower 2.23 miles of Pogues Run is enclosed in an underground box culvert. Flood plains have residential sections interspersed with industries, parks and cemeteries. Flood seasons are winter and early spring when general heavy rains occur. Intense summer and fall thunderstorms also cause flooding. Stream velocities may reach 10 feet per second in channel during major floods while overbank velocities seldom exceed 4 ft/sec. Duration of flood is relatively short while rates of rise are generally high. An extensive flood control project is proposed and partially built for Pleasant Run and Bean Creek. State and local regulations prohibit floodway construction. The greatest flood occurred in May 1956 when a peak discharge of 2,280 cubic feet per second was recorded on Pleasant Run. During an Intermediate Regional Flood peak discharges of 4,620 cfs, 6,920 cfs and 3,420 cfs are predicted on Pogues Run, Pleasant Run and Bean Creek respectively. During a Standard Project Flood peak discharges of 10,500, 17,000 and 8,260 cfs are expected on the three creeks. (Salzman - North Carolina)
W76-11354

FLOOD PLAIN INFORMATION: LICK CREEK AND LITTLE BUCK CREEK, MARION COUNTY, INDIANA.
Army Engineer District, Louisville, Ky.
Prepared for Marion County Metropolitan Planning Department and Indianapolis Flood Control District, June 1971. 38 p, 23 fig, 11 plates, 6 tab.

Descriptors: Floods, *Flood plains, *Flood plain zoning, *Flood profiles, *Flash floods, *Flood protection, Land uses, Obstruction to flow, Channel improvements, Flow characteristics, Historic floods, *Indiana.
Identifiers: Lick Creek(IN), Little Buck Creek(IN), Marion County(IN), Standard Project Flood, Intermediate Regional Flood.

The creeks of this study flow generally west and drain adjacent areas on the east side of the West Fork White River. Varying from 200 feet to 1500 feet wide, the flood plains have residential land uses, and undeveloped land. Past floods have inundated portions of this land. Strong residential growth in Perry Township, main basin areas of Lick and Little Buck Creeks, indicates increasing use of flood plain areas in the future. Floods from heavy rains occur primarily from January to April. Intense local thunderstorms can cause flash flooding during any season. Flood duration is relatively short in upper reaches where channel velocities could reach 12 feet per second on Lick Creek and 10 ft/sec on Little Buck Creek. Lower reaches may be flooded for longer periods due to back water effects from West Fork White River. Channel relocation and improvements have been completed on Lick Creek. State legislation requires prior approval of any construction on flood plains. Natural obstructions as well as 74 bridges and one dam could impede flood flow. The largest recorded flood was in July 1969 when 400-500 people in Marion and Johnson counties were forced to flee their homes. Estimated peak discharges for an Intermediate Regional Flood at the mouths of Lick Creek and Little Buck Creek would be 9,200 cubic feet per second and 9,600 cfs respectively. For a Standard Project Flood at the same location peak discharges are estimated at 17,500 cfs and 12,600 cfs respectively. (Salzman - North Carolina)
W76-11355

FLOOD PLAIN INFORMATION: LITTLE ARKANSAS RIVER AND SAND CREEK, SEDGWICK, KANSAS.
Army Engineer District, Tulsa, Okla.
Prepared for the City of Sedgwick, Kansas, April 1974. 31 p, 6 fig, 14 plates, 6 tab.

Descriptors: Floods, *Flood stages, *Flood plains, *Flood protection, Non-structural alternatives, Control structures, *Flood profiles, Runoff, Flood flow, Historic floods, Flood data, Peak discharge, Flow characteristics, Flood damage, Dams, Channel improvement, *Kansas.
Identifiers: Little Arkansas River(KS), Sand Creek(KS), Flood plain management, Sedgwick(KS), Standard Project Flood, Intermediate Regional Flood.

The study reach encompasses 10.5 miles of the Little Arkansas River, a major tributary of the Arkansas River, and 8.5 miles on Sand Creek, a left bank tributary of the Little Arkansas River, with a total drainage area of 1,200 square miles. In gently rolling farmland, the stream valleys are relatively flat with flood plain widths exceeding 2 miles. There are no flood control projects in the study area although Sand Creek has been cleared and enlarged above the study limits. Most floods occur in April through September with relatively fast runoffs in the upper reaches but slower flood runoffs in the lower reaches characterized by less steep slopes. Flows exceed channel capacity at least once a year. The highest known flood occurred on July 6, 1904. The greatest recorded flood, on June 9, 1965, had peak discharges of 9,800 cubic feet per second on Sand Creek and 18,000 cfs on the river. Estimated peak discharges for an Intermediate Regional Flood and Standard Project Flood are 63,000 cfs and 103,900 cfs, respectively on the Little Arkansas River and 17,750 cfs and 32,900 cfs on Sand Creek. With increasing development in the flood plains, now primarily agricultural, damages would be substantial. A proposed plan to build 3 flood water retarding structures and 19 detention dams is outlined. Other guidelines for a flood plain management program are suggested. (Salzman-North Carolina)
W76-11356

FLOOD PLAIN INFORMATION: BIG SANDY RIVER, BOYD COUNTY, KENTUCKY.
Army Engineer District, Huntington, W. Va.
Prepared for the Commonwealth of Kentucky, Department of Natural Resources, May 1972. 39 p, 9 fig, 10 plates, 4 tab.

Descriptors: Floods, *Flood profiles, *Flood plains, Levees, *Floodwalls, Floodwater, Flood flow, Historic floods, Warning systems, Reservoirs, *Kentucky.
Identifiers: *Big Sandy River(KY), Catlettsburg(KY), Lockwood(KY), Burnaugh(KY), Standard Project Flood, Intermediate Regional Flood.

As extensive developed lands lie in the flood plains of the Big Sandy River, large future floods could cause considerable damage to residences, businesses, industry (including an oil refinery, an activated carbon plant, and a chemical plant), and transportation facilities. The Big Sandy joins the Ohio River at Catlettsburg (population 3420 in 1970) and it is backwater effects from the Ohio which cause the most severe flooding. The Big Sandy has a drainage area of 4,290 square miles and is formed by the confluence of Levisa and Tug Forks 105 miles upstream from the Ohio River. Floods from heavy rainfall generally occur in months January through March. Numerous floods causing much damage have occurred on the Big Sandy. By far the largest was the 1937 flood when damage surpassed the sum of $1 million. Water rose 3.5 feet above the current Standard Project Flood level and 7 feet above the Intermediate Regional Flood level. No discharge records are available for these floods. For large floods water velocities of 8 feet per second in the channel and 3 feet per second in the overbank area are anticipated. An Intermediate Regional Flood is expected to rise to peak in 102 hours and last 10 days, while the Standard Project Flood would rise in 158 hours and last 14 days. In comparison, the 1937 flood rose in 274 hours and lasted 18 days. There are no significant obstructions to flood flow across the river. Future flood heights have been considerably reduced by reservoir projects upstream from Catlettsburg which is protected by levees and floodwalls. (Smith-North Carolina)
W76-11357

FLOOD PLAIN INFORMATION: QUINEBAUG RIVER - CADY BROOK, TOWN OF SOUTHBRIDGE, MASSACHUSETTS.
Army Engineer District, Waltham, Mass.
Prepared for the Town of Southbridge, February 1972. 41 p, 6 fig, 7 plates, 9 tab.

Descriptors: Floods, Streamflow forecasting, *Flood data, *Flood stages, Flow characteristics, *Flood plains, *Flood protection, Planning, *Massachusetts, Flood flow, Historic floods, Flow duration, Control structures, Reservoirs, Channel improvement, Dams, Flood profiles, Hurricanes.
Identifiers: *Quinebaug River(MA), Cady Brook(MA), Southbridge(MA), Intermediate Regional Flood, Standard Project Flood, Thames River Basin(MA).

Southbridge, located on the Quinebaug River in southcentral Massachusetts, rests in the upper

portion of the Thames River Basin. Regulated by 2 dams above the study area, the Quinebaug River drains 744 square miles and flows southeasterly for 5 miles in the study reach through relatively narrow valleys with little development. Near Cady Brook, a tributary of the Quinebaug, there are some industrial and residential areas. Bridges do not generally obstruct flood flows and the 3 low dams allow flood flows to pass. Flooding occurs in the spring and results from heavy rains combined with snowmelt. However, the 2 highest floods resulted from hurricanes. Two reservoirs control 80% of the drainage area and will prevent serious flooding. Other flood damage prevention measures include widening and deepening of the channel of the Cady Brook and construction of concrete retaining walls. The greatest flood occurred in August 1955 and caused more than $18 million damages in Southbridge because of failure of the Glenecho Dam on Cady Brook and the Globe Tool and Die Company Dam on the Quinebaug River. The river had a peak discharge of 36,000 cubic feet per second. An Intermediate Regional Flood and Standard Project Flood would crest at 8.5 feet and 6.8 feet respectively, lower than the 1955 event and have peak discharges of 9,100 cfs and 13,500 cfs on the Quinebaug River at the Southbridge-Dudley town line. This report aids in the solution of local flood problems and in the best utilization of land subject to overflow. (Salzman-North Carolina)
W76-11358

FLOOD PLAIN INFORMATION: MERRIMACK RIVER, CITY OF CONCORD, NEW HAMPSHIRE.
Army Engineer District, Waltham, Mass.
Prepared for the City of Concord, New Hampshire, August 1972. 21 p, 7 fig, 8 plates, 6 tab.

Descriptors: Floods, *Flow duration, Flow characteristics, *Flood plains, *Flood protection, *Flood profiles, *New Hampshire, Historic floods, Flood data, Flood stages, Peak discharge, Rivers, Non-structural alternatives, Planning, Dams, Control structures.
Identifiers: *Merrimack River(NH), Concord(NH), Flood damage reduction measures, Intermediate Regional Flood, Standard Project Flood.

Located in south-central New Hampshire, the Merrimack River, in this study reach, meanders in a horse shoe shaped fashion toward the southeast for 9.8 miles with an average slope of .7 feet per mile. It drains 1,507 square miles above the study area. The flood plains, primarily agricultural areas with some residential and large commercial developments, are .75 to 1.5 miles wide. Floods occur during all seasons but usually result from spring snowmelt in combination with rainfall. Flood flow stages rise slowly and stay above flood stage for long periods of time with high velocities averaging 4 to 6 feet per second in the main channel. There are moderate quantities of floatable materials stored on the flood plains which may be carried away and obstruct bridge openings and damage structures. No flood plain regulations exist. The greatest known flood occurred on March 20, 1936, and had an estimated peak discharge of 122,000 cubic feet per second. Estimated damage was $500,000 in Concord. Other major floods occurred in September 1938, March 1953, April 1960 and April 1969. Beginning with the March 1953 flood, floods have been reduced in severity by regulation of Franklin Falls, Blackwater and Edward MacDowell Dams and Hopkinton-Everett Lakes. An Intermediate Regional Flood and Standard Project Flood would have peak discharges of 46,000 cfs and 92,800 cfs respectively. Damage could be extensive. During an IRF main channel velocities would be 4 to 6 ft/sec with slightly higher velocities in the SPF. Overbank velocities would average 1 to 2 ft/sec and would deposit debris and silt. (Salzman-North Carolina)
W76-11359

FLOOD PLAIN INFORMATION: ALUM CREEK, VICINITY OF COLUMBUS, OHIO.
Army Engineer District, Huntington, W. Va.
Prepared for the State of Ohio Department of Natural Resources, May 1967. 51 p, 14 fig, 8 plates, 2 tab.

Descriptors: Floods, Streamflow forecasting, *Flood data, *Flood plains, *Flood profiles, Peak discharge, Non-structural alternatives, Control structures, Obstructions to flow, Channel improvements, Historic floods, *Ohio.
Identifiers: *Alum Creek(OH), Columbus(OH), Intermediate Regional Flood.

Alum Creek's study reach covers a distance of 23 miles and passes through developed urban and suburban areas of the cities of Columbus, Bexley, and Westerville as well as rural land. Flowing southerly with an average slope of 7.4 feet per mile, the creek has relatively narrow flood plains varying from 300 to 3,000 feet wide. Three low dams and 26 bridges have a minor effect in obstructing flood flows. Channel improvements have been made in some areas and flood plain zoning regulations and flood plain restrictions have been adopted by Columbus and Franklin Counties. A multi-purpose reservoir on Alum Creek in Delaware County was authorized by Congress in 1962. Intended for flood control, water supply and recreation purposes, it should reduce cresting stage about 3 feet below the level of the March 1963 flood. The greatest flood occurred January 22, 1959, cresting at 753.2 feet means sea level (gage zero is 733.62 msl) with an estimated discharge of 26,400 cubic feet per second. Communities in Alum Creek valley were unprepared for the rapid rise of flood waters and suffered extensive flooding over large areas. Damages were $3 million (1959 prices). An Intermediate Regional Flood would be expected to crest at 752.0 feet and have a peak discharge of 22,500 cfs. Structural improvements, reservoirs, levees, flood walls, watershed treatment and planning techniques including zoning subdivision regulations, urban renewal and establishment of open space lands are discussed. (Salzman-North Carolina)
W76-11360

FLOOD PLAIN INFORMATION: SOUTH FORK RIVANNA RIVER, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
Prepared for the Albemarle County Board of Supervisors, March 1973. 18 p, 10 fig, 11 plates, 5 tab.

Descriptors: Floods, *Flood control, *Flood plains, *Flood profiles, Flood protection, *Virginia.
Identifiers: *South Fork Rivanna River(VA), Albemarle County(VA), Charlottesville(VA).

South Fork Rivanna River, northwest of Charlottesville, has a drainage area of 268 square miles. It joins the North Fork to form the Rivanna River which flows 41.55 miles before emptying into the James River. The average slope of the South Fork is 6.6 feet per mile while its tributaries which reach into the Blue Ridge Mountains have much steeper slopes. The narrow flood plain is wooded or open farm land and undeveloped except for several small dams which do not provide flood control. Floods occur during all sons caused by rainfall as well as hurricane activity or from snowmelt in combination with rainfall. The greatest flood, in October, 1942, occurred when about 10 inches of rain fell on the Rivanna River watershed in 3 days as part of a hurricane approached the area, creating extensive flooding in Charlottesville. The most recent flood on February 18, 1960, crested at 12 feet with peak discharge of 6,010 cfs. No flood damage reduction measures exist. An Intermediate Regional Flood (IRF) and Standard Project Flood (SPF) would result in the inundation of mostly agricultural land with peak discharges of 53,400 cfs and 90,000 cfs respectively. Velocities for the SPF will be even higher, possibly reaching 22 ft/sec. Flood stage duration will be 27 hours for IRF, 59 hours for an SPF. This report is to assist in land use planning and in preparing ordinances concerning flood plain utilization, since future development in the area around Charlottesville may encroach on the delineated flood plain. (Salzman - North Carolina)
W76-11361

SNOWMELT RUNOFF FROM PLANTED CONIFERS IN SOUTHWESTERN WISCONSIN,
Forest Service (USDA), St. Paul, Minn. North Central Forest Experiment Station.
R. S. Sartz, and D. N. Tolsted.
USDA Research Note NC-205, 2 p, 1976. 4 ref, 2 tab.

Descriptors: *Snowmelt, *Runoff, *Forest watersheds, *Wisconsin, *Conifers, Snowpack, Overland flow, Pine trees, Watersheds(Basins), Frost, Infiltration, Slopes.
Identifiers: Red pine(Pinus resinosa), Norway spruce(Picea abies), European larch(Larix decidua), Spruce trees, Larch trees.

Snowmelt overland flow was measured for one season from 10-year-old plantations of red pine (Pinus resinosa), Norway spruce (Picea abies), European larch (Larix decidua), and from old field control plots, on both north and south slopes, in southwestern Wisconsin. Pine and spruce plots produced more runoff than larch and old field plots; and south slope plots produced more runoff than north slope plots. (Witt-IPC)
W76-11369

STATISTICAL SUMMARIES OF INDIANA STREAMFLOW DATA,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 7C.
W76-11409

HYDROLOGIC RECORDS FOR LAKE COUNTY, FLORIDA, 1973-74,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7C.
W76-11414

BENEATH THE TENN-TOM,
Geological Survey, Nashville, Tenn.
J. Van Brahana.
Water Spectrum, Vol 7, No 4, p 17-24, Winter 1975-76.

Descriptors: *Baseline studies, *Water resources, *Water quality, *River training, *Tennessee River, Projections, Surface waters, Groundwater, Construction, Inland wateways, River systems, Ships, Hydrologic systems, Environmental effects, Data collections, Evaluation.
Identifiers: *Tennessee-Tombigbee Waterway project.

A new waterway soon will connect the inland Tennessee River system with the Gulf of Mexico via the Black Warrior Waterway, shortening some shipping distances as much as 800 miles and extensively modifying the surface-water flow characteristics over a 2,000-square-mile area. Test holes were drilled at strategic locations along the proposed route to aid in defining the existing flow system. Some of the changes in the water quality of surface water that may occur during construction and others that may result from subsequent operation activity include: increase in sediment loads, increase in turbidity, pH change in vicinity of fresh cuts, thermal stratification in deep impoundments, introduction and concentration of minor metals, decrease in dissolved oxygen, increase in wastes from developing areas, changes in nutrient loading, and contamination from accidental spills of material being transported. Some of these effects on the quality of the surface water

may be transmitted to interconnected aquifers and thereby change ground-water quality. Water levels will be raised along 90 percent of the waterway, enhancing opportunities for ground-water development in adjoining areas. In the remaining 10 percent, which is the cut in the divide section, water levels will be lowered about 100 feet adjacent to the cut near its midpoint but closely approach the original levels at the north and south ends of this reach. (Woodard-USGS)
W76-11415

PROGRAMMABLE CALCULATORS: MODERN INSTRUMENTS FOR ANALYZING HYDROLOGIC DATA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7B.
W76-11416

WATER CURRENT FORCE MEASURING APPARATUS,
For primary bibliographic entry see Field 7B.
W76-11444

HYPOLIMNION OXYGENATION,
Union Carbide Corp., New York. (Assignee).
For primary bibliographic entry see Field 5G.
W76-11454

HYDRAULIC MODEL STUDIES OF MECHANICAL MIXING DEVICES IN STRATIFIED LAKES,
Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.
For primary bibliographic entry see Field 8B.
W76-11495

THE POTENTIAL IMPACT OF SATELLITE DATA-RELAY SYSTEMS ON THE OPERATION OF HYDROLOGIC DATA PROGRAMS,
Geological Survey, Reston, Va. ; and Geological Survey, Bay Saint Louis, Miss.
For primary bibliographic entry see Field 7B.
W76-11497

INFORMATION TRANSFER FOR STREAM DISCHARGE,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7A.
W76-11499

SCOUR AND FILL PATTERNS IN POOL-RAPID RIVERS,
Arizona Univ., Tucson. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 2J.
W76-11511

SEDIMENT YIELD AS RELATED TO A STOCHASTIC MODEL OF EPHERMERAL RUNOFF,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
For primary bibliographic entry see Field 2J.
W76-11512

MANAGEMENT OF WATER RESOURCES UNDER DIFFERENT SOCIO-ECONOMIC CONDITIONS,
Arizona University, Tucson, Committee on Arid Lands Resources.
For primary bibliographic entry see Field 6B.
W76-11514

RIPARIAN DENDROCHRONOLOGY: A METHOD FOR DETERMINING FLOOD HISTORIES OF UNGAGED WATERSHEDS,
Arizona Univ., Tucson. Lab. of Tree-Ring Research.
C. W. Stockton, and D. Laing.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 967, $3.50 in paper copy, $3.00 in microfiche. Completion Report, August 1976. 18 p, 4 fig, 4 tab, 10 ref. OWRT A-058-ARIZ(1). 14-34-0001-6003.

Descriptors: *Dendrochronology, *Flood damage, *Flood frequency, *Land use, History, Dating, Snowpack, Plant growth, Watershed management, Arizona, Utah, Colorado.
Identifiers: *Crossdating, *Riparian zone, *Tree growth.

Examination of 106 crossdated tree-ring cores from the riparian zone of Pine Creek near Escalante, Utah, 10 cores from Bright Angel Creek, Grand Canyon, Arizona, 8 cores from South Taylor Creek, Zion National Park, Utah, and 5 cores from the Animas River near Silverton, Colorado, has yielded the following information: (1) Various riparian gymnosperm and angiosperm species crossdate with semi-arid site gymnosperms. (2) Tree growth is best correlated with snowpack water equivalent. (3) Flood damage to trees is manifested in growth suppression on root exposure or burial, in reaction wood on tilting, and in scarring. (4) Flood damage is very infrequent at Pine Creek from 1700 to 1880, more so from 1880 to 1909, and very frequent from 1909 to the present. (The town of Escalante was settled in 1875, and stocking of the range around Pine Creek reached a maximum shortly after 1900). (5) Flood damage shows fairly constant frequency in the Bright Angel Creek watershed, which has seen little land use. (6) Flood damage on South Taylor Creek shows a marked increase in frequency between about 1900 and 1937 when the region was included in Zion National Monument, after which flood damage declined markedly in frequency.
W76-11523

URBAN STORMWATER MANAGEMENT MODELING AND DECISION-MAKING,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
For primary bibliographic entry see Field 5D.
W76-11599

FIRST THE WATER, THEN THE SEWER, THEN LAND USE PLANNING: COASTAL PLANNING IN RETROSPECT AND IN THE NOW,
North Carolina State Planning Div., Raleigh.
For primary bibliographic entry see Field 5D.
W76-11622

4B. Groundwater Management

INTERNATIONAL ASSOCIATION OF DRILLING CONTRACTORS DRILLING MANUAL,
International Association of Drilling Contractors, Houston, Tex. Rotary Drilling Committee.
For primary bibliographic entry see Field 8C.
W76-11102

TOXIC HEAVY METALS IN GROUND WATER OF A PORTION OF THE FRONT RANGE MINERAL BELT,
Colorado School of Mines Golden. Dept. of Chemistry; and Colorado School of Mines, Golden. Dept. of Geochemistry.
For primary bibliographic entry see Field 5B.
W76-11105

MECHANISMS OF LEACHATE FORMATION IN SANITARY LANDFILLS,
University of Southern California, Los Angeles. Environmental Engineering Program.
For primary bibliographic entry see Field 5B.
W76-11118

UNDERGROUND STORAGE OF STATE WATER PROJECT SUPPLY, A PROGRESS REPORT,
Los Angeles City Dept. of Water and Power. Aqueduct Div.
D. L. Georgeson.
In: Proceedings, Tenth Biennial Conference on Ground Water, September 11-12, 1975, Ventura, California, p 9-11.

Descriptors: *Storage capacity, *Underground storage, *Groundwater basins, Pumped storage, Resource development, Groundwater, Wells, Groundwater mining, *California.
Identifiers: State Water Project, *Dewatered aquifers, *Groundwater basin inventory, Groundwater basin storage capacity, Pumping facilities, Southern California.

During the last two years, the Southern California Water Conference has studied the engineering, legal and institutional feasibility of implementing the storage of State Water Project supplies in the dewatered space available in southern California's ground water basins. A basin-by-basin inventory was taken to determine the capability of each ground-water basin to store State Project water. The inventory indicated that approximately 4,535,000 acre-feet of dewatered basin capacity was available. In addition it was determined that there was approximately 4,582,000 acre-feet of water already in storage in ground-water basins which could be extracted using present facilities, and approximately 3,573,000 acre-feet of water which could be extracted with modification of present-day facilities. A coincident study entitled 'Ground Water Storage of State Water Project Supplies' reported that the State Water Project had the capability to convey 2,610,000 acre-feet of State Project water to southern California during the period 1975 through 1982. A third activity was the work of a legal and institutional subcommittee which drafted an agreement for delivery and use of State Project water. (Heiss-NWWA)
W76-11119

BELGIUM (LEGISLATION ON UNDERGROUND WATERS).
Food and Agriculture Organization of the United Nations, Rome (Italy).
For primary bibliographic entry see Field 6E.
W76-11120

ENGLAND AND WALES, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United Nations, Rome (Italy).
For primary bibliographic entry see Field 6E.
W76-11121

FRANCE, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United States, Rome (Italy).
For primary bibliographic entry see Field 6E.
W76-11122

ISRAEL, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United Nations, Rome (Italy).
For primary bibliographic entry see Field 6E.
W76-11123

ITALY, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United Nations, Rome (Italy).
For primary bibliographic entry see Field 6E.
W76-11124

SPAIN, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United Nations, Rome (Italy).
For primary bibliographic entry see Field 6E.
W76-11125

TURKEY, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United States, Rome (Italy).
For primary bibliographic entry see Field 6E.
W76-11126

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES. PHASE I. FINAL REPORT,
Purdue University, West Lafayette, Indiana, Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W76-11175

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: REGIONAL AQUIFER EVALUATION STUDIES WITH STOCHASTIC INPUTS,
Purdue University, West Lafayette, Indiana, Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W76-11176

SHALLOW SUBSURFACE DISPOSAL OF WASTEWATER,
North Carolina Dept. of Natural and Economic Resources. Div. of Environmental Management.
For primary bibliographic entry see Field 5E.
W76-11228

TOWARDS A COMPUTER-BASED INFORMATION MONITORING SYSTEM FOR GROUNDWATER DATA IN NEW ZEALAND,
Illinois Univ. at Chicago Circle. Dept. of Geological Sciences.
R. B. McCammon.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 31-6-1 - 31-6-5. 2 fig, 4 ref.

Descriptors: *Data storage and retrieval, *Computer programs, *Data collections, *Groundwater, *Water quality, Data processing, Wells, Water sampling, Monitoring.
Identifiers: *New Zealand.

The development of a computer-based information retrieval system for groundwater data in New Zealand is discussed. Currently there are over 20,000 water well records on file in New Zealand dealing with information obtained from drilling, subsequent test pumping, and water quality analyses. Thus, the need exists for developing a computerized storage and retrieval system. Three types of computer dialogues are currently being considered: question-and-answer types, menu-selection types, and natural-English dialogues. The importance of involving potential users in the development of the groundwater information system is stressed. (See also W76-10637) (Kreager-FIRL)
W76-11247

PUERTO RICO: ALONG THE ROUTE OF WATER REUSE,
Environmental Protection Agency, San Juan, Puerto Rico.
For primary bibliographic entry see Field 5D.
W76-11259

COMPUTER PROGRAM FOR THREE-DIMENSIONAL PLOTTINGS FROM IRREGULAR FINITE ELEMENT GRID,
California Univ., Davis. Dept. of Land, Air and Water Resources.
For primary bibliographic entry see Field 2F.
W76-11327

SOME ISSUES REGARDING REGULATORY POLICY, POLITICAL PARTICIPATION, AND SOCIAL IMPLICATIONS OF GEOTHERMAL RESOURCE DEVELOPMENT IN THE IMPERIAL VALLEY,
Center for Social and Behavioral Science Research. University, Riverside, California.
For primary bibliographic entry see Field 6E.
W76-11328

AN EXPERIMENTAL HIGH-ASH PAPER MILL SLUDGE LANDFILL,
Michigan State Univ., East Lansing.
For primary bibliographic entry see Field 5E.
W76-11379

GROUND-WATER RECORDS FOR NORTHEASTERN OKLAHOMA: PART 1--RECORDS OF WELLS, TEST-HOLES, AND SPRINGS,
Geological Survey, Oklahoma City, Okla.
For primary bibliographic entry see Field 7C.
W76-11412

BENEATH THE TENN-TOM,
Geological Survey, Nashville, Tenn.
For primary bibliographic entry see Field 4A.
W76-11415

GROUND-WATER FLOW AND POLLUTION AT A WELL FIELD, OLEAN, NEW YORK,
Geological Survey, Albany, N. Y.
For primary bibliographic entry see Field 5B.
W76-11417

FEASIBILITY OF MODELLING THE INFLUENCES OF PIT RECHARGE ON GROUNDWATER LEVELS AND QUALITY IN ALLUVIAL BASINS,
Water Resources Research Center, Tucson.
For primary bibliographic entry see Field 2F.
W76-11487

PROCEEDINGS TENTH BIENNIAL CONFERENCE ON GROUND WATER, TOTAL WATER MANAGEMENT FOR CALIFORNIA'S LONG-RANGE NEEDS.
California State Dept. of Water Resources, Scramento.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 808, $9.00 in paper copy, $3.00 in microfiche. California Water Resources Center, Davis, Report No. 33, December 1975. 257 p. Held at Ventura, California, September 11-12, 1975. Edited by Frank T. Bragg.

Descriptors: *Groundwater, *Water management(Applied), *Water supply, Water reuse, Planning, Water utilization, *Conferences, Legal aspects, Regulation, Water quality, *California, *Conjunctive use, Water conservation.

The conference, co-sponsored by the California Dept. of Water Resources and the California Water Resources Center, included papers under the following session topics: Innovation in Conjunctive Use of Ground and Surface Water; Ground Water Conservation, Protection and Use--Some Technical and Institutional Considerations; Energy and Economic Considerations in the Use and Development of Ground Water; and Legal and Regulatory Aspects. (Snyder - California, Davis)
W76-11491

GEOPHYSICAL PROSPECTING FOR GROUND WATER IN ALASKA,
Geological Survey, Denver, Colo.
H. Ackermann.
Geological Survey Earthquake Information Bulletin, Vol 8, No. 2, p 18-20, March-April 1976. 4 fig.

Descriptors: *Geological surveys, *Groundwater resources, *Alaska, *Seismic studies, *Electrical resistance, Explosives, Exploration, Seismographs, Locating, Groundwater, Water supply, Methodology.

For several years the U. S. Geological Survey has been assisting the Air Force in locating water supplies in frozen areas of Alaska. Two geophysical prospecting methods, seismic refraction and electrical resistivity, complement each other in exploring for ground water in frozen areas because both electrical resistivity and seismic velocity have large values in frozen earth. Similarly, velocities and resistivities are high in areas of shallow unfractured rock. Consequently, areas of frozen earth and unfractured (nonporous) rocks are to be avoided for a potential water supply. The trick then is to locate subsurface zones of lower seismic velocity and electrical resistivity because these are likely water reservoirs. These layers may be water-saturated permeable rock, glacial material, alluvium, or fault gouge. Once located, such zones are prospected in great detail so that a precise location for a drill hole or gallery can be recommended. (Woodard-USGS)
W76-11496

DEEP WELL DISPOSAL OF WASTEWATER,
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5E.
W76-11617

GROUNDWATER SUPPLIES OF THE COASTAL REGION,
For primary bibliographic entry see Field 5F.
W76-11618

WASTEWATER REUSE IN COASTAL AREAS,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5D.
W76-11620

IMPACT OF WATER SUPPLY AND WASTEWATER ON THE COASTAL AND MARINE ENVIRONMENTS,
North Carolina State Univ., Raleigh. Sea Grant Program.
For primary bibliographic entry see Field 5D.
W76-11625

4C. Effects On Water Of Man's Non-Water Activities

THE IMPACT OF SUBURBANIZATION ON STREAM NETWORKS,
Iowa Univ., Iowa City. Inst. of Urban and Regional Research.
W. L. Graf.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-256 229 $4.00 in paper copy, $3.00 in microfiche. Final Report 14, (ISWRRI-75), June 1976. 34 p., 7 fig., 9 tab, 23 ref. OWRT A-059-IA(1).

Descriptors: *Streams, *Iowa, *Urbanization, *Hydrographs, Channels, Open channels, Cities, *Suburban areas, Networks, Drainage basins, Flash floods.
Identifiers: Iowa City(Iowa), *Channel networks, Kurtosis, Storm hydrographs.

Analysis of geomorphic, hydrologic, and suburbanization data from a small instrumented drainage basin near Iowa City, Iowa, indicates that channel networks are radically altered when suburban development overtakes a drainage basin. Change in channel networks are generally such that the network becomes much more efficient in collecting water quickly, so that lag time and kurtosis of storm hydrographs are altered to produce the familiar flash floods of urban areas. The data show that network change are most closely associated with kurtosis of storm hydrographs, and suggest that corrective measures be concentrated on the internal linkages of the network.
W76-11113

CHLORIDE MANAGEMENT IN LAKE ERIE BASIN,
State Univ. of New York at Buffalo. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W76-11114

HYDROLOGIC DATA FOR URBAN STUDIES IN THE SAN ANTONIO, TEXAS METROPOLITAN AREA, 1974,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W76-11413

HUTTON'S SHEARWATERS INITIATING LOCAL SOIL EROSION IN THE SEAWARD KAIKOURA RANGE,
Forest and Range Experiment Station, Rangiora (New Zealand).
For primary bibliographic entry see Field 2J.
W76-11518

4D. Watershed Protection

EFFECT OF PLANTATION ESTABLISHMENT ON SOIL AND SOIL WATER IN SOUTHWESTERN WISCONSIN,
Forest Service (USDA), St. Paul, Minn. North Central Forest Experiment Station.
R. S. Sartz.
USDA Research Paper NC-127, 8 p, October, 1975. 2 fig, 20 ref, 7 tab.

Descriptors: *Groundwater, *Soil moisture, *Watershed management, *Forest watesheds, Pine trees, *Wisconsin, Soil density, Soil chemistry, Soils, Carbon, Nitrogen compounds, Surface runoff, Freezing, Springs, Streamflow, Erosion control, Soil water, Snowmelt, Snowpack, Slopes, Conifers, Storm runoff.
Identifiers: Eastern white pine(Pinus strobus), Red pine(Pinus resinosa), White spruce(Picea glauca), European larch(Larix decidua), Spruce trees.

Plantations of eastern white pine (Pinus strobus), red pine (P. resinosa), white spruce (Picea glauca), and European larch (Larix decidua) were established on three sites in southwestern Wisconsin and the changes in letter weight, soil bulk density, soil nitrogen and organic carbon contents, soil water depletion, and snowpack accumulation were evaluated over 14 years of growth. The sites included an upper northern slope of 10 percent, a lower north slope of 25 percent, and a middle south slope of 25 percent. The greater amounts of litter that built up under larch would seem to make it a preferred species for watershed management planting; however, the additional litter may have no value in preventing rainfall runoff. It may reduce soil freezing, which could reduce snowmelt runoff. The plantations are not yet old enough to have reduced soil bulk density. By the 10th year, the pine and larch plantings were using substantially more water from the top meter of soil than the unplanted control, and a little more than a natural hardwood forest. The additional water depleted by the trees can reduce flood runoff potential from summer storms, but on the other hand, this may reduce the contribution to groundwater, springflow, or stream base flow, which would have a negative effect of water production. (Witt-IPC)
W76-11365

SNOWMELT RUNOFF FROM PLANTED CONIFERS IN SOUTHWESTERN WISCONSIN,
Forest Service (USDA), St. Paul, Minn. North Central Forest Experiment Station.
For primary bibliographic entry see Field 4A.
W76-11369

AGRICULTURE AND CLEAN WATER--PROCEEDINGS OF A CONFERENCE TO EXPLORE CONTROL STRATEGY FOR AGRICULTURAL NONPOINT SOURCE WATER POLLUTION.
For primary bibliographic entry see Field 5G.
W76-11406

WATER QUALITY OF STREAMFLOW FROM PONDEROSA PINE FOREST WATERSHEDS ON SEDIMENTARY SOILS,
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 5A.
W76-11490

INFLUENCE OF SIMPLIFICATIONS IN WATERSHED GEOMETRY IN SIMULATION OF SURFACE RUNOFF,
Agricultural Research Service, Tucson, Ariz.
For primary bibliographic entry see Field 2A.
W76-11517

RIPARIAN DENDROCHRONOLOGY: A METHOD FOR DETERMINING FLOOD HISTORIES OF UNGAGED WATERSHEDS,
Arizona Univ., Tucson. Lab. of Tree-Ring Research.
For primary bibliographic entry see Field 4A.
W76-11523

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

TOXIC HEAVY METALS IN GROUND WATER OF A PORTION OF THE FRONT RANGE MINERAL BELT,
Colorado School of Mines Golden. Dept. of Chemistry; and Colorado School of Mines, Golden. Dept. of Geochemistry.
For primary bibliographic entry see Field 5B.
W76-11105

CADMIUM UPTAKE BY MARINE FISH LARVAE,
Bundesforschungsanstalt fuer Fischerei, Hamburg (West Germany). Institut fuer Kuesten- und Binnenfischerei.
For primary bibliographic entry see Field 5C.
W76-11184

ECOLOGY OF THE LITTORAL POLYCHAETE STREPTOSYLLIS WEBSTERI, A NEW SPECIES IN THE BALTIC,
Morski Iqstytut Rybacki, Gdynia (Poland).
For primary bibliographic entry see Field 5B.
W76-11186

THE TOXICITY OF THE HERBICIDE DICHLOBENIL TO GOLDFISH (CARASSIUS AURATUS),
Utrecht Rijksuniversiteit (Netherlands). Inst. of Veterinary Pharmacology and Biological Toxicology.
For primary bibliographic entry see Field 5C.
W76-11188

ACUTE TOXICITY OF CERTAIN PESTICIDES TO ACARTIA TONSA DANA,
Hazleton Labs. America, Inc., Vienna, Va.
For primary bibliographic entry see Field 5C.
W76-11193

DESIGN OF POLLUTANT ORIENTED INTEGRATED MONITORING SYSTEMS,
Environmental Protection Agency, Las Vegas, Nev.
For primary bibliographic entry see Field 7B.
W76-11238

PROBLEMS IN ANALYSES OF ORGANIC POLLUTANTS IN OPEN-OCEAN SAMPLES,
Texas A and M Univ., College Station. Dept. of Chemistry.
C. S. Giam, H. S. Chan, and G. S. Neff.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 21-1-1 - 21-1-3. 3 tab, 3 ref.

Descriptors: *Pollutant identification, *Organic compounds, *Analytical techniques, *Sampling, Equipment, *Quality control, *Sea water, DDT, Polychlorinated biphenyls, Chlorinated hydrocarbon pesticides, Water analysis.
Identifiers: Phthalate ester plastizers, Sample collection, Laboratory reagents.

Techniques for avoiding the contamination of open-ocean samples during collection and analysis for organic pollutants are discussed. General precautions against contamination include: concentrating an aliquot of each bottle of reagent used in the procedure; the removal of organics from laboratory tap water by liquid-liquid extraction; the cleaning of solid reagents by heating; the purification of gases used to evaporate solvents by passage through a molecular sieve or other suitable trap; the use of equipment made from glass, teflon, or metal; the avoidance of materials made from plastics, rubber, and cork; the use of a minimum amount of equipment; and the performance of frequent procedure blanks. Selected results of analyses performed on samples from the Gulf of Mexico are presented for DDT, polychlorinated biphenyl, and phthalate ester plastizers to illustrate the efficacy of such precautions. (See also W76-10637) (Kreager-FIRL)
W76-11239

THE MEANING AND MEASUREMENT OF TURBIDITY,
National Oceanographic Instrumentation Center, Washington, D.C.
B. S. Pijanowski.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 21-6-1 - 21-6-5. 6 fig, 13 ref.

Descriptors: *Analytical techniques, *Turbidity, *Water quality, *Optical properties, *Suspended solids, Physical properties, *Measurement, Instrumentation, Equipment, Calibrations.
Identifiers: Transmissometers, Nephelometers, Ambient light meters, Jackson candle turbidimeter.

Problems associated with the use of turbidity as an optical indicator of water quality are discussed along with recommendations of a workshop on turbidity sponsored by the National Oceano-

graphic Instrumentation Center. The term turbidity is recommended for use only as a qualitative descriptor and not as a parameter for measurement. The concept of turbidity is optical and in a broad sense is an indication of suspended particulate matter. A single optical measurement cannot be used to measure suspended particulates in general because the optical characteristics of the particulates are complex functions of particle size and shape, absorption, and other parameters. It is recommended that when optical measurements are made they be identified with the type of instrument used and that the instruments not be calibrated in artificial units as is the common practice currently. Conceptual descriptions of the following types of turbidity measuring instrumentation are provided: the Jackson Candle turbidimeter, transmissometers, nephelometers, and ambient light meters. Accepted methods for turbidity measurements and instrument calibration are also outlined. (See also W76-10637) (Kreager-FIRL)
W76-11240

THE ENVIRONMENTAL INFORMATION SYSTEM (EIS) IN SWEDEN AND MONITORING OF THE ENVIRONMENT,
Swedish Council of Environmental Information, Stockholm. Jordbruksdepartementet.
I. Palmlund, and I. Andersson.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 25-2-1 - 25-2-3. 1 fig, 1 tab.

Descriptors: *Data collections, *Data processing, *Information retrieval, *Monitoring, Programs, Measurement, *Pollutant identification, Methodology, Environment.
Identifiers: *Sweden, *Environmental information systems.

The structure of the Swedish Environmental Information System is outlined. The system is designed to provide coordinated and standardized data collection concerning air, water, and ground quality in both polluted and unpolluted areas. Information concerning products and chemical substances subject to control, major polluting sources, and research and data collection activities throughout the country is also provided by the system. The development of the Environmental Information System is now in progress under the direction of the Swedish Council of Environmental Information which is also planning a study of the coordinated utilization of the Environmental Information System and meteorological, hydrological, and other data bases. (See also W76-10637) (Kreager-FIRL)
W76-11241

ANALYSIS OF ORGANIC POLLUTANTS IN DRINKING WATER.
Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
I. H. Suffet, and J. V. Radziul.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 30-1-1 - 30-1-7. 5 fig, 4 tab, 23 ref.

Descriptors: *Analytical techniques, *Separation techniques, *Pollutant identification, *Potable water, *Organic compounds, Gas chromatography, Mass spectrometry, Ethers, Water analysis.
Identifiers: Chlorinated hydrocarbons, Aromatic hydrocarbons, Chloroform, Trichloroacetone, Acetones, Chlorinated alkanes, Precursor compounds, Bis(2-chloroethyl)ether, Benzenes.

Isolation techniques and analytical method for the determination of organic compounds in drinking water are discussed. Isolation techniques covered include: liquid-vapor phase isolation in the form of head gas analysis, liquid-liquid phase isolation in the form of solvent extraction, liquid-solid phase isolation in the form of carbon adsorption, and absorption by macroreticular resins. Analytical approaches are discussed in terms of quantitative and general screening methods. The development of quantitative analysis techniques for bis(2-chloroethyl)ether, chloroform are described along with the use of gas chromatography/mass spectrometry for the identification of organic compounds in Philadelphia drinking water. A list of 20 organic compounds found in the drinking water is presented and reveals the presence of 1,1,1-trichloroacetone, a precursor of chloroform. A constant background of hydrocarbon substituted benzene and chlorinated alkanes is also observed for the drinking water sample. (See also W76-10637) (Kreager-FIRL)
W76-11242

FLUORESCENCE MEASUREMENTS OF CARCINOGENIC AND POLYCYCLIC AROMATIC HYDROCARBONS IN WATER,
National Bureau of Standards, Washington, D.C. Inst. for Materials Research.
F. P. Schwartz, and S. P. Wasik.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 30-2-1 - 30-2-5. 5 fig, 10 ref.

Descriptors: *Fluorescence, *Spectrophotometry, *Pollutant identification, *Aromatic compounds, Analytical techniques, Feasibility studies, Evaluation, Sea water, Water analysis.
Identifiers: *Polynuclear aromatic hydrocarbons, *Carcinogens, Naphthalene, Anthracene, Pyrene, Fluoranthene.

The feasibility of using fluorescence spectrometry for determining carcinogenic and polycyclic aromatic hydrocarbons in water was investigated. At naperian absorbances of less than or equal to 0.05, the fluorescence intensities of solutions containing naphthalene, anthracene, pyrene, and fluoranthene in water were a superposition of the component fluorescence spectra. The fluorescence spectra varied unpredictably with concentration when viewed perpendicular to the excitation light and at higher polynuclear aromatic optical densities in the mg/liter range. Polynuclear aromatic fluorescence intensity was not affected by the presence of sodium chloride at sea water concentrations or by the presence of mg/liter concentrations of iron, zinc, cobalt, or nickel cations in water. (See also W76-10637) (Kreager-FIRL)
W76-11243

MONITORING FOR ORGANIC POLLUTANTS IN GREAT BRITAIN,
Analysis Automation Ltd., Oxford (England).
A. Verdin.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 30-3-1 - 30-3-3. 5 fig, 19 ref.

Descriptors: *Monitoring, *Water quality, *Effluents, *Organic compounds, *Analytical techniques, Instrumentation, Equipment, Measurement, Biochemical oxygen demand, Chemical oxygen demand, Carbon, Gas chromatography, Mass spectrometry, Ultraviolet radiation, Oil, *Pollutant identification.
Identifiers: Great Britain.

Water and air pollution monitoring activities in Great Britain are reviewed. Although the basic parameter in British water treatment is the 5-day biochemical oxygen demand value which is not amenable to adaption for continuous monitoring, a number of commercial systems for chemical oxygen demand and other measurements are being used for effluent monitoring. A simple on-line device which uses the correlation between total organic carbon or biochemical oxygen demand and ultraviolet absorption at 254 nanometers has also been developed. An oil-in-water monitor which uses the single beam ultraviolet absorption principle and sophisticated sample conditioning system is being used at a North Sea oil facility. Extensive multiparameter water quality networks are being developed in Britain, although they do not include any organics monitors yet. Individual organics are analyzed in grab samples by gas chromatography and mass spectrometry. (See also W76-10637) (Kreager-FIRL)
W76-11244

ENVIRONMENTAL INDICES AND MONITORING,
Department of the Environment, Ottawa (Ontario). Science Policy Branch.
H. Inhaber.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 31-1-1 - 31-1-3. 6 ref.

Descriptors: *Monitoring, *Data collections, *Data processing, *Indicators, Measurement, Evaluation, Analytical techniques, Environment, *Pollutant identification.
Identifiers: Environmental indices.

The usefulness of environmental indices is discussed along with their relationship to monitoring. Environmental indices compare the actual state of part of the environment to a desirable standard. Since indices are only as good as the data on which they are based, their usefulness depends on adequate and accurate monitoring facilities. The use of environmental indices can indirectly diminish problems associated with overlapping monitoring policies and networks since they provide a goal for monitoring activities. Indices also tend to speed up the processing and reporting of environmental data since their purpose is to inform the public on the state of the environment. Since environmental indices tend to regularize the collection of data, problems associated with assessing the synergistic effects of pollutants are diminished by the use of indices. (See also W76-10637) (Kreager-FIRL)
W76-11245

SOME PRACTICAL PROBLEMS IN DEVELOPING AND PRESENTING ENVIRONMENTAL QUALITY INDICES TO THE PUBLIC,
Environmental Protection Agency, Seattle, Wash. Region X.
For primary bibliographic entry see Field 5G.
W76-11246

TOWARDS A COMPUTER-BASED INFORMATION MONITORING SYSTEM FOR GROUNDWATER DATA IN NEW ZEALAND,
Illinois Univ. at Chicago Circle. Dept. of Geological Sciences.
For primary bibliographic entry see Field 4B.
W76-11247

X-RAY DIFFRACTION AND ELECTRON BEAM ANALYSIS OF ASBESTIFORM MINERALS IN LAKE SUPERIOR WATERS,
National Water Quality Lab., Duluth, Minn.
P. M. Cook, I. B. Rubin, C. J. Maggiore, and W. J. Nicholson.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 34-1-1 - 34-1-9. 7 fig, 2 tab, 12 ref.

Descriptors: *Asbestos, *Lake Superior, *Electron microscopy, *Potable water, *X-ray diffraction, *Pollutant identification, Industrial wastes, Mineral industry, Solid wastes, Analytical techniques, Lakes.
Identifiers: *Asbestiform amphibole fibers, Taconite tailings.

Electron microscopic and X-ray diffraction analyses of asbestiform amphibole fibers in Lake

Superior water are reported. The lake, which is used for municipal water supplies, contains large concentrations of asbestiform minerals as a result of a taconite tailings discharge at Silver Bay, Minnesota. Daily X-ray diffraction studies and occasional transmission electron microscope measurements of Duluth, Minnesota drinking water samples revealed amphibole fiber counts per liter of water ranging from 10-1000 million, with the average being 45-100 million. Not all of the amphibole fibers present can be identified due to their extremely small width. Large fluctuations in fiber concentrations are attributable to seasonal and meteorological changes which influence Western Lake Superior water circulation. Variations in electron microscope amphibole fiber counts generally correspond to variations in amphibole mass concentration determined by X-ray diffraction. (See also W76-10637) (Kreager-FIRL)
W76-11248

AUTOMATED FLUORIDATION USING A SELECTIVE ION ELECTRODE,
Peterborough Utilities Commission, Peterborough, Ontario, Canada, Filtration Plant.
For primary bibliographic entry see Field 5F.
W76-11251

SOURCE IDENTIFICATION OF FUEL OIL SPILLS,
Ontario Ministry of the Environment, Rexdale. Lab. Services Branch.
O. W. Berg, P. L. Diosady, R. L. Gutteridge, A. A. Nicholson, and H. L. Vanesche.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 483-492, 1974. 10 fig, 5 tab, 13 ref.

Descriptors: *Oil spills, *Water pollution, *Pollutant identification, Oil, Fuels, Pollutants, Analytical techniques, Spectroscopy, Ultraviolet radiation, Gas chromatography, Chemical analysis, Oil pollution, Ships, Water pollution sources, Infrared radiation.
Identifiers: Fluorescence spectrometry.

Ultraviolet, infrared and fluorescence spectrometry and gas chromatography were studied as methods for the passive tagging of furnace fuel oil spills. It was found that only gas chromatography, using a sulphur sensitive flame photometric detector, was capable of distinguishing between different brands of furnace oil which had been weathered for more than twenty four hours. (See also W76-11275) (Sims-ISWS)
W76-11314

BACTERIA AND PHOSPHORUS AS INDICATORS OF THE EXTENT OF A LARGE SEWAGE SPILL IN LAKE ERIE,
Canada Centre for Inland Waters, Burlington (Ontario).
N. M. Burns, H. R. van Otterloo, and B. J. Dutka.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 493-500, 1974. 4 fig, 4 tab, 9 ref.

Descriptors: *Sewage, *Sewage bacteria, *Phosphorus, *Lake Erie, Bacteria, Coliforms, Streptococcus, Dissolved oxygen, Sewage effluents, Wastes, Pollutants, Water pollution, Water pollution effects, Path of pollutants, Lakes, Epilimnion, Hypolimnion, Surveys, Limnology.
Identifiers: *Sewage spills.

On June 21, 1971, a sewage treatment plant in Cleveland, Ohio, broke down and discharged 19,000 cu m/hr of raw sewage for approximately ten days. Immediately after the spill ceased, water samples from the epilimnion and hypolimnion were collected from the surrounding U.S.A. waters and across the international boundary. These samples were analyzed for coliforms, fecal coliforms, fecal streptococci, dissolved oxygen, particulate organic carbon, and total filtered and total unfiltered phosphorus. From the collected data, and comparisons with earlier Lake Erie data, it was found that only coliforms and phosphorus values were affected by the discharge at the time of the study with coliforms providing the only clear indication of the extent of the spill. Coliform data indicated that the sewage discharge affected bacterial populations up to and across the international boundary line. The failure of phosphorus values to detect the extent of the spill and the use of coliform bacteria to define the boundaries of the plumes were discussed. (See also W76-11275) (Sims-ISWS)
W76-11315

THE EFFECT OF A FOSSIL FUEL POWER PLANT'S COOLING WATER SYSTEM ON THE WATER QUALITY OF GREEN BAY, WISCONSIN,
Wisconsin Univ., Green Bay. Coll. of Environmental Sciences.
For primary bibliographic entry see Field 5B.
W76-11319

A LIMNOLOGICAL SURVEY OF NEARSHORE WATERS OF LAKE SUPERIOR,
Ontario Ministry of the Environment, Toronto. Water Resources Branch.
For primary bibliographic entry see Field 2H.
W76-11321

AN INVESTIGATION OF THREE METHODS FOR THE DETERMINATION OF SUBMICROMOLAR ION CONCENTRATIONS IN WATER,
Wisconsin Univ., Madison. Dept. of Chemistry.
W. J. Blaedel, G. W. Schieffer, R. A. Niemann, and D. E. Dinwiddie.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 579, $4.50 in paper copy, $3.00 in microfiche. Wisconsin Water Resources Center, Madison Technical Report WFS WRC 76-01, June 1976. 44 p, 1 tab, 23 fig, 32 ref. OWRT A-053-WIS(5) 14-31-0001-4050 14-31-0001-5050.

Descriptors: *Pollutant identification, Methodology, Sampling, *Ion exchange, *Copper, *Electrodes, *Speciation, Trace elements, Analytical techniques, Water analysis.
Identifiers: *Trace metal ions, *Ion-selective electrodes, *Copper ions, Tubular electrodes, Anodic stripping voltammetry.

Two methods were studied for the sampling, concentration, or determination of trace metal ions at submicromolar levels. 1. Trace ions in a sample donor solution are concentrated by loading upon a pellicular ion exchanger, and these are eluted or stripped into an acceptor solution at an enhanced concentration level so that they can be more easily measured. In studies with Cu(II), enhancements up to 64-fold have been obtained that are in accord with the theoretical Donnan enchancement. Times required are reasonable, being about a half hour for the loading step and about five minutes for the stripping step. Equipment and procedure are being designed to permit estimations of copper ion concentration or activity (speciation) in the field. 2. With sample solution flowing through two tubular electrodes in series, trace metal ions may be deposited cathodically at the upstream electrode, and then stripped off by scanning the upstream electrode toward anodic potentials. With the proper control of conditions, and with the downstream electrode maintained at a constant cathodic potential, collector currents due to metal ions stripped from the upstream electrode can be measured at the downstream electrodes and used for estimating the trace metal ion concentration in the original sample solution. Although the collector currents are smaller than the stripping currents they are observed against a very low and steady background current, in contrast to the high and varying background charging currents observed at the stripping electrode. An expression for the dependence of stripping and collector currents upon deposition time, solution flow rate, etc. has been derived and tested.
W76-11331

IDENTIFICATION OF STABLE ORGANIC COMPOUNDS IN WASTE EFFLUENT,
Connecticut Univ., Storrs. Inst. of Water Resources.
R. P. Collins.
Available from the National Technical Information Service Springfield Va 22161, as PB-256 562, $3.50 in paper copy, $3.00 in microfiche. Completion Report June 1976. 11 p, 4 tab, 2 fig. OWRT A-053-CONN(1), 14-31-0001-3807.

Descriptors: *Organic compounds, *Chlorination, Wastewater treatment, Gas chromatography, Mass spectrometry, Analytical techniques, *Pollutant identification, Organic wastes, Effluents, Infrared radiation, Chemical wastes, Phenols, Sludge, *Industrial wastes.
Identifiers: *Purifax process, *Infrared spectrometry, Textile industry wastes.

Laboratory investigations to identify the refractory organic chemicals released in the wastewater of local textile plants and to determine the fate of these compounds after the wastewater treatment process were carried out. Effluents and sludge from a Purifax Water Treatment Plant were analyzed by gas chromatography infrared and mass spectrometry. Chemical reagents, including ortho phenylphenol, para phenylphenol, biphenyl and methyl salicylate, which are utilized by the textile industries using the Purifax facility were subjected to chlorination and analyzed. Over one hundred compounds were detected by gas chromatography in effluent and sludge obtained from the Purifax plant. Many of the compounds utilized in the textile industry readily chlorinated and could be detected in both the effluent and sludge obtained from the treatment plant. (de Lara-Connecticut)
W76-11338

SOURCES OF WATER QUALITY, LAKE LEVEL, ICE, WATER TEMPERATURE, AND METEOROLOGICAL DATA FOR THE ST. LAWRENCE GREAT LAKES,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
For primary bibliographic entry see Field 7C.
W76-11363

STREAM SEDIMENT COMPOSITION: AN AID TO WATER QUALITY ASSESSMENT,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group.
S. R. Aston, I. Thornton, J. S. Webb, J. B. Purves, and B. L. Milford.
Water Air Soil Pollut. 3(3), p 321-325, 1974.

Descriptors: *Sediments, Water quality, *Trace elements, Mine wastes, Mining, Geochemistry, *Pollutant identification, Maps.

The trace element composition of stream sediments from catchments contaminated by past and present mining activities was used to indicate the trace element status of associated waters. The possibility of using geochemical reconnaissance maps based on the analysis of stream sediments as an ancillary aid to water quality evaluation is discussed.--Copyright 1975, Biological Abstracts, Inc.
W76-11367

DETERMINATION OF ALUMINUM UNDER PAPERMAKING CONDITIONS,
Papiripari Vallalat Kutato- es Fejlesztointezete, Budapest (Hungary).
J. Papp.
Svensk Papperstidning, Vol. 79, No. 9, p 286-291, May 30, 1976. 11 fig, 23 ref.

Descriptors: *Pulp and paper industry, *Aluminum, *Water analysis, Potentiometers, Electrochemistry, Electrodes, Fluorides, Ions, Wastes, Industrial wastes, Water pollution sources, Trace elements, Effluents, *Pollutant identification.
Identifiers: *White water(Paper machines), Aluminum sulfate, Rosin size.

A fluoride-selective electrode method for the direct potentiometric analysis of aluminum in paper mill effluents is described. It is simple and rapid and suited for the analysis of alum-containing white waters, provided all solids have been filtered off. In its present form, the method cannot be used to determine total aluminum introduced into systems containing pulp plus rosin size, since part of the aluminum in the pulp and in precipitates is not accessible to reaction with fluoride ions. (Brown-IPC)
W76-11386

DETERMINATION OF LIGNIN IN EFFLUENTS (OPREDELENIE LIGNINA V STOCHNYKH VODAKH),
Vsesoyuznyi Nauchnyi Planovii Otdel Bumazhnoi Promyshlennost, Moscow (USSR).
A. A. Sokolova, D. P. Moseeva, and L. A. Semakova.
Bumazhnaya Promyshlennost, No. 2, p 23-24, February, 1976. 2 tab.

Descriptors: *Lignins, *Pulp wastes, *Spectrophotometry, Analytical techniques, Water pollution sources, Ultraviolet radiation, Chemical precipitation, Filtration, Drying, Separation techniques, Effluents, Wastes, Industrial wastes, *Pollutant identification.
Identifiers: *Black liquors, Rosin acids, Wood extractives.

The presence of extractives (mainly rosin acids) in kraft black liquor introduces a considerable error into the determination of lignin by ultraviolet absorption spectrophotometry (at 280 nm), because the extractives absorb at the same frequency. The lignin content determined may be as much as 25% higher than the actual content. A modified formula is presented for calculating the lignin content from spectrophotometric data which takes into account the concentration and the specific absorption of the extractives. The concentration of the extractives is determined in a black liquor sample by precipitating lignin with HC1, separating it by filtration, drying, and extracting with petroleum ether in a Soxhlet apparatus. The solvent is evaporated, the residue dried and weighed and the concentration of extractives calculated. The specific absorption of the extractives is determined spectrophotometrically in ethanol solution. (Stapinski-IPC)
W76-11387

PHOTOMETRIC METHOD FOR THE CONTROL OF SUSPENDED SOLIDS IN SEDIMENTATION TANKS (FOTOMETRICHESKII METOD KONTROLYA VZVESHENNYKH VESHCHESTV V OTSTOINIKAKH),
Vsesoyuznyi Nauchnyi Planovyi Otdel Bumazhnoi Promyshlennost, Moscow (USSR).
S. S. Simonov, Yu. D. Miromanov, and I. A. Evstigneev.
Bumazhnaya Promyshlennost, No. 2, p 24, February, 1976. 1 fig.

Descriptors: *Suspended solids, *Pulp wastes, Instrumentation, Settling basins, *Photometry, Equipment, Water pollution sources, Foreign countries, Pulp and paper industry, Monitoring, Effluents, *Settling tanks, Sedimentation.
Identifiers: USSR, Clarifiers, Savealls, Process control.

The apparatus described, which was developed at the All-Union Research Institute of the Pulp and Paper Industry (USSR), allows not only controlling the operation of a sedimentation tank by sample analysis, but also obtaining full information on the distribution of suspended solids directly in the operating tank within a short time (1.5-2 hr.). In the apparatus (a diagram of which is given), a resistance box is included in the circuit of a photoresistor, and the reduction in voltage is measured by a recording potentiometer. The photoelectric sensor, which is immersed in the liquid, consists of a turbidity meter and an automatic indicator of the sediment level. The photometric method of determining the distribution of suspended solids can also be used in clarifiers with a suspended sediment layer, in savealls, etc. (Stapinski-IPC)
W76-11390

ON-SITE BIOASSAY TESTING AT CARIBOO PULP AND PAPER,
Cariboo Pulp and Paper Co., Quesnel (British Columbia).
For primary bibliographic entry see Field 5C.
W76-11394

SIMPLIFIED KJELDAHL NITROGEN DETERMINATION FOR SEAWATER BY A SEMIAUTOMATED PERSULFATE DIGESTION METHOD,
Suffolk County Dept. of Environmental Control, Hauppauge, N.Y.
J. M. Adamski.
Analytical Chemistry, Vol. 48, No. 8, p 1194-1197, July, 1976. 2 fig, 7 ref, 5 tab.

Descriptors: *Nitrogen, *Sea water, *Water analysis, Analytical techniques, Trace elements, Water chemistry, Colorimetry, Chemical analysis, Phenols, Ammonia, Pollutant identification.
Identifiers: *Kjeldahl nitrogen, Potassium persulfate.

Persulfate digestion in combination with indophenol colorimetry via a Technicon AutoAnalyzer II was used as an alternative to the standard Kjeldahl nitrogen method as specified in 'Standard Methods for the Examination of Water and Wastewater' (American Public Health Association). Application of this method to the analysis of seawater samples demonstrated that a large quantity of samples can be rapidly processed with relative ease in a small environmental laboratory. A detection limit of 0.06 mg/liter as nitrogen was calculated for the operating range 0-5.6 mg/liter. Seawater samples spiked with 3.00 mg/liter of ammonia nitrogen were analyzed with a precision of 0.25 mg/liter and a spike recovery of 105+6.8%. Seawater samples spiked with 3.35 mg/liter of Kjeldahl nitrogen contained in a raw domestic waste were analyzed with a precision of +0.30 mg/liter and a spike recovery of 100+8.1%. The persulfate method simplifies the determination of Kjeldahl nitrogen in seawater while successfully maintaining low level requirements for sensitivity, precision, and accuracy. (Witt-IPC)
W76-11396

MICROGRAM DETERMINATION OF BORON IN SURFACE WATERS BY ATOMIC EMISSION SPECTROMETRY,
Utah State Div. of Health, Salt Lake City. Bureau of Labs.
F. D. Pierce, and H. R. Brown.
Analytical Chemistry, Vol. 48, No. 4, p 670-673, April, 1976. 2 fig, 8 ref, 3 tab.

Descriptors: *Water analysis, *Boron, *Surface waters, *Spectroscopy, Analytical techniques, Water pollution sources, Trace elements, Water chemistry, Water properties, Water quality, *Pollutant identification, *Spectrophotometry.
Identifiers: *Atomic emission spectrometry.

A description is given of an automated method for the analysis of boron in surface water specimens by atomic emission spectrometry. The technique employs a nonmechanical concentration step, an automated boron concentration by methanol distillation, and an automated aspiration-analysis procedure. Sixty specimens can be distilled and 180 distilled specimens can be analyzed per hour. The detection limit and the sensitivity provided by the technique are 0.002 mg/liter and 0.004 mg/liter, respectuvekt, (Witt-IPC)
W76-11397

DETERMINATION OF URANIUM IN NATURAL WATERS BY NEUTRON ACTIVATION ANALYSIS,
Los Alamos Scientific Lab., Los Alamos, N.Mex.
E. S. Gladney, J. W. Owens, and J. W. Starner.
Analytical Chemistry, Vol. 47, No. 7, p 973-975, June, 1976. 13 ref, 3 tab.

Descriptors: *Water analysis, *Uranium radioisotopes, *Natural streams, Analytical techniques, *Neutron activation analysis, Anion exchange, Alaska, New Mexico, Water pollution sources, Radioisotopes, Trace elements, Water chemistry, *Pollutant identification.

A rapid procedure has been developed for the measurement of uranium in natural waters using thermal neutron activation and anion-exchange separation of radio-uranium from ethanol/HCl solvent mixtures. Detection limits of 0.05 ppb have been achieved with analytical precisions of +10-30%. Results of uranium analyses by this procedure and by fluorometry are compared for natural water samples from Alaska and New Mexico. (Witt-IPC)
W76-11398

HYDROLOGIC DATA FOR URBAN STUDIES IN THE SAN ANTONIO, TEXAS METROPOLITAN AREA, 1974,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W76-11413

HYDROLOGIC RECORDS FOR LAKE COUNTY, FLORIDA, 1973-74,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7C.
W76-11414

GROUND-WATER FLOW AND POLLUTION AT A WELL FIELD, OLEAN, NEW YORK,
Geological Survey, Albany, N. Y.
For primary bibliographic entry see Field 5B.
W76-11417

ANALYSIS OF SELECTED BENTHIC COMMUNITIES IN THE FLORIDA EVERGLADES WITH REFERENCE TO THEIR PHYSICAL AND CHEMICAL ENVIRONMENT,
Geological Survey, Tallahassee, Fla.
B. G. Waller.
Available from the National Technical Information Service, Springfield, Va 22161, as ADA-25593, $4.00 in paper copy, $3.00 in microfiche.
Water-Resources Investigations 76-28, April 1976. 33 p, 6 fig, 7 tab, 21 ref.

Descriptors: *Water quality, *Marshes, *Canals, *Florida, *Benthos, Invertebrates, Water analysis, Environmental effects, Flow rates, Discharge(Water), Agricultural runoff, Sewage effluents, Data collections, Water pollution sources.
Identifiers: *Everglades(Fla).

Species diversity and numbers of benthic macroinvertebrates were determined at 12 sites, both canals and marshes, in the Everglades of south Florida. The values calculated are used to indicate long-term trends in water quality and variations between study areas. Species diversity at all sites was generally in a range indicative of degraded water quality. The number of organisms per square meter of bottom surface was highly variable ranging from 43 to 8,200 organisms. Chemical analysis of water and bottom material indicated no gross contamination from sewage or agricultural runoff in any of the canals where benthic organisms were collected. Other physical factors such as depth, velocity of flow, substrate type, and water-level fluctuation were responsible for the low species diversities and variable numbers of organisms, rather than contamination from urban or agricultural areas. (Woodard-USGS)
W76-11418

THE NATIONAL STREAM QUALITY ACCOUNTING NETWORK,
Geological Survey, Reston, Va.
J. S. Cragwall, Jr.
The Military Engineer, Vol 68, No 441, p 25-27, January-February 1976. 2 fig, 2 tab.

Descriptors: *Water quality, *Data collections, *Monitoring, *Networks, *United States, Regional analysis, Hydrologic data, Planning, Network design, Surface waters, Groundwater, Pollutant identification.
Identifiers: NASQAN.

The U. S. Geological Survey (USGS) has established the National Stream Quality Accounting Network (NASQAN) to make continuous measurements needed to assess national and regional water quality. NASQAN, which is based on a hydrologic subdivision of the United States, presently includes 345 stations, and is designed to include 525 stations when completed. Data are collected on a wide-range of physical, chemical, and biological characteristics. Samples are processed through the USGS Central Laboratory System, a group of large laboratories which have been established to take advantage of efficient and sensitive, but expensive instruments. NASQAN will provide an assessment of water quality on national and regional scales, but a host of other programs are needed to provide all the information required to manage water quality. (Woodard-USGS)
W76-11419

WETTABILITY OF HUMIC ACID AND ITS SALTS,
For primary bibliographic entry see Field 2K.
W76-11421

A PRELIMINARY STUDY ON THE OCCURRENCE AND DISTRIBUTION OF GEOFUNGI IN LAKE ONTARIO NEAR THE NIAGARA RIVER,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2H.
W76-11427

BACTERIAL POPULATIONS IN LOWER GREEN BAY,
Wisconsin Univ. Green Bay, Coll. of Environmental Sciences.
For primary bibliographic entry see Field 2H.
W76-11428

IFYGL CHEMICAL INTERCOMPARISONS,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2H.
W76-11430

PARTICULATE RESIDENCE TIMES,
Atmospheric Environment Service, Toronto (Ontario).
D. M. Whelpdale.
Water Air Soil Pollut. 3(3), p 293-300, 1974.

Descriptors: *Air pollution, *Canada, *Great Lakes, Lakes, Mathematical models, Pollutant identification, Path of pollutants, Water pollution.
Identifiers: *Lake St. Clair, *Air particulate deposition(Lakes).

Examination of suspended particulate concentration data from a 1 yr-long, regional air-quality study of a portion of the Great Lakes (Canada) area revealed that depletion of particulates occurred during extended periods of travel over water surfaces. Based on particulate concentrations and meteorological measurements, residence times of background regional particulate matter were between 5-16 h in the region. Using a simple model for the deposition of particulate matter into the lakes, deposition rates ranging from 0.2-3.9 micro-g m-2 s-1 were found. This results in an estimated 150 metric tons of material being deposited into Lake St. Clair, area 1270 km2, during a 24 h period.--Copyright 1975, Biological Abstracts, Inc.
W76-11450

AN INTEGRATED STUDY ON THE IMPACT OF METALLIC TRACE ELEMENT POLLUTION IN THE COEUR D'ALENE-SPOKANE RIVERS-LAKE DRAINAGE SYSTEM,
Washington State Univ., Pullman. Dept. of Sanitary Engineering.
For primary bibliographic entry see Field 5C.
W76-11488

WATER QUALITY OF STREAMFLOW FROM PONDEROSA PINE FOREST WATERSHEDS ON SEDIMENTARY SOILS,
Arizona Univ., Tucson. School of Renewable Natural Resources.
P. F. Ffolliott.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-256 760 $3.50 in paper copy, $3.00 in microfiche. Completion Report, August 1976. 4 p, 1 tab, 2 ref. OWRT A-066-ARIZ(2), 14-34-0001-6003.

Descriptors: *Water quality, Watershed management, Land use, Water analysis, *Ponderosa Pine tree, *Arizona, *Pollutant identification, *Forest watershed, Correlation analysis, Salts, Surface runoff, Streamflow, Water sampling.
Identifiers: *Sedimentary soils.

Water samples were collected weekly and at times of unusual hydrological events from 4 ponderosa pine watersheds on sedimentary soil to; (1) examine the chemical, physical, and bacteriological characteristics (2) explore the empirical association of these water quality parameters with land use patterns, and (3) analyze the interactions among these parameters. In each sample, calcium, magnesium, and sodium were measured using atomic absorption spectrophotometry; carbonate and bicarbonate were measured by titrating with standard acid; and fluoride, sulfate, nitrate, phosphate (in a limited number of samples), and chloride amounts were determined by colorimetric methods using an Autoanalyzer. Hydrogen ion concentrations were measured using a glass electrode; suspended sediment concentrations were determined by filtration; and the presence of fecal coliform was determined using the membrane filter technique. Statistical analyses indicated no significant difference between water quality parameters among the four watersheds. Correlation analysis revealed that pH was inversely related to sodium, chloride, nitrate, and bicarbonate, and positively associated with calcium. Streamflow discharge was positively related to fluoride and nitrate, and negatively correlated to sodium and total soluble salts. While conductivity and total soluble salts were positively associated, no associations existed between concentrations of individual chemical constituents and suspended sediment, nor between concentrations of suspended sediment and streamflow discharge. No fecal coliform was found in the samples tested. (Hasbrouck-Arizona)
W76-11490

NON-POINT SOURCE WATER QUALITY MONITORING, INYO NATIONAL FOREST, 1975,
California University, Los Angeles, Environmental Science and Engineering.
Available from the National Technical Information Service Springfield, Va. 22161 as PB-256 713 $5.50 in paper copy, $3.00 in microfiche. Progress Report, Contribution No. 156 California Water Resources Center, Davis, March 1976. 138 p, 67 fig, append. Edited by J. Baas, F. D. Westerdahl, and R. L. Perrine. (California Water Resources Center Project UCAL-WRC-W-489).

Descriptors: *Water quality, *Monitoring, Environmental effect, *Recreation wastes, National parks, *California, Water pollution sources, *Sampling, Tests, Testing procedures, *Pollutant identification.
Identifiers: *Inyo National Forest(Calif).

Results are presented of a study on the impact of non-point sources on water quality in wilderness and recreational areas within the Inyo National Forest. One objective was to assess water quality with regard to physical, chemical and bacteriological parameters in a manner evaluation of area-wide sources. A second objective was to develop improved test methods for continuing water quality monitoring and protection in such areas. A monitoring program was conducted, in which 34 sites, selected by the U. S. Forest Service, were sampled one or more times during the summer and fall of 1975. Most sites can be characterized as high altitude, alpine lakes of small to moderate size or streams, snow-fed from granite basins. All sites represent areas frequented by recreational visitors, and were sampled with their use as a primary concern. Physical measurements included air and water temperature, dissolved oxygen, pH and total dissolved solids. Chemical analyses included tests for sulfates, nitrate-nitrogen, Kjeldahl nitrogen, chloride, phosphates, total phosphorus and methylene blue active substances. Bacteriological observations included total and fecal coliform organism and Yersinia enterocolitica. Additional sampling concerned algae in a portion of the lakes studied. A separate research effort by means of laboratory-scale experimental investigation looked into the means of transport of bacteria from sites at which they might be deposited to a nearby water body. (Snyder-California, Davis)
W76-11492

BACTERIAL AND COLIFORM COUNTS IN THE WATER SUPPLY OF SLAUGHTER HOUSES SITUATED IN THE VICINITY OF SALVADOR-BAHIA: BRIEF NOTE, (IN PORTUGUESE),
Universidade Federal da Bahia, Salvador (Brazil).
Edred Novaes Teixeira, and Carlos Adan Cordeiro.
Bol Inst Biol Bahia. 12(1), p 102, 1973.

Descriptors: Water supply, *Bacteria, *Coliforms, Industrial wastes, *Pollutant identification, *Industrial water, South America.
Identifiers: *Brazil(Salvador-Bahia), Slaughter house wastes.

Good quality water must be used in food processing to avoid contamination of the finished products. In order to evaluate the quality of the water being used in slaughter houses around Salvador-Bahia, Brazil, bacteriological testing was conducted. Of 22 water samples analyzed, 19 revealed total viable bacterial counts of greater than 500 colonies/ml. Presumptive coliform counts

ranged from 0-9.2 organisms/ml of water.--Copyright 1975, Biological Abstracts, Inc.
W76-11525

METHOD OF DETERMINING RESIDUES OF THE HERBICIDE LENACIL IN WATER, SOIL AND SUGAR BEETS, (IN RUSIAN),
Lab. Toxicol., All-Russ. Res. Inst. Plant Prot., Ramon, USSR. Vserossiiskii Nauchno-Issledovatelskii Institut Zashchity Rastenii, Ramon (USSR). Lab. of Toxicology.
V. S. Shustrov, and D. A. Shvets.
Vopr Pitan. 2, p 85-86, 1974.

Descriptors: *Pollutant identification, *Herbicides, *Pesticide residues, *Solvent extractions, *Chromatography, Water analysis, Soils, Sugar beets, Distillation.
Identifiers: Chloroform extraction, *Lenacil, Thin layer chromatography.

The chemically pure herbicide, lenacil, is a colorless, odorless crystalline powder containing 80% of the active principle 3-cyclohexyl-5,6-trime thylene uracil. The method developed for determining residues of lenacil in water, soil and sugar beets is based on extraction of the herbicide from the investigated sample with chloroform, distillation of the solvent and TLC. The sensitivity of the method is 5-10 micro g of lenacil in the sample.--Copyright 1975, Biological Abstracts, Inc.
W76-11527

STUDY OF WATER SORPTION ON BIOPOLYMERS, (IN RUSSIAN).
Politekhnicheskii Institut, Leningrad (USSR).c
For primary bibliographic entry see Field 2K.
W76-11532

BACTERIOCOENOTIC STUDIES ON A WEAKLY DYSTROPHIC STREAM, (IN GERMAN),
For primary bibliographic entry see Field 5C.
W76-11533

BACTERIOCOENOTIC STUDIES ON AN OLIGOTROPHIC STREAM, (IN GERMAN),
For primary bibliographic entry see Field 5C.
W76-11534

BACTERIOCOENOSE STUDIES ON AN EUTROPHIC BIOTOPE, (IN GERMAN),
For primary bibliographic entry see Field 5C.
W76-11535

THE STATISTICAL APPROACH TO THE STUDY OF THE SMALL RIVERS HYDROCHEMICAL REGIME IN WESTERN POLESYE OF THE UKRAINIAN SSR, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hydrobiologii.
I. V. Grib, and B. I. Nabivanets.
Gidrobiol Zh. 10(2), p 11-21, 1974.

Descriptors: *Statistical studies, Rivers, Water chemistry, Estimating, Dissolved oxygen, Biochemical oxygen demand, *Carbonates, *Calcium, *Chlorides, Ions, *Mineralogy, *Pollutant identification.
Identifiers: Polesye, *Ukrainian-SSR, USSR.

A statistical analysis was performed for long-term data on the hydrochemical regime of small rivers in western Polesye of the Ukraine (USSR). The processing involved the following hydrochemical estimates: BPK5 (biochemical O2 demand for 5 days), dissolved O2, permanganate oxidability NH3-N, chlorides, Ca, Mg, hydrocarbonates and mineralization. Equations showing the relation of these estimates to water out-flow rates were formulated and respective correlation coefficients calculated. The natural background is assumed as a basis for deducing mineralization equations expressed through the HCO3-, Ca2+ and C1- contents. --Copyright 1975, Biological Abstracts, Inc.
W76-11536

BACTERIAL POPULATIONS IN SKADAR LAKE, (IN SERBO-CROATIAN),
Zavod Za Biologiju Mora, Kotor (Yugoslavia).
For primary bibliographic entry see Field 5C.
W76-11538

THE EFFECT OF PREPARATION ON THE MERCURY CONTENT OF FISH AND MUSHROOMS, (IN GERMAN),
Bundesforschungsanstalt fuer Lebensmittelfrischhaltung, Karlsruhe (West Germany). Institut fuer Strahlen-technologie.
R. Schelenz, and J. F. Diehl.
Lebensm-Wiss + Technol. 8(2), p 85-86, 1975.

Descriptors: *Mercury, Fish, Pollutant identification.
Identifiers: *Agaricus-Spp, *Leuciscus-Rutilus, Mushrooms, *Fish preparation(Cooking).

Leuciscus rutilus (4) were filleted and steamed for 20 min. and fried for 10 min. Two Agaricus spp. were washed, halved and stewed in their own juices for 20 min. Hg content decreased very slightly in the fish after steaming and frying. The cooking residue left after the steaming of the fish contained 0.04-0.10 micro-g Hg. The residue of the mushrooms contained 0.07-0.21 micro-g.--Copyright 1975, Biological Abstracts, Inc.
W76-11546

QUANTITATIVE CHARACTERISTICS OF DISTRIBUTION OF BDELLOVIBRIO BACTERIOVORUS IN RIVER WATER, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Biochemistry and Physiology of Microorganisms.
V. A. Lambina, N. A. Chuvil'skaya, L. A. Ledova, A. V. Afonigenova, and I. V. Averburg.
Mikrobiologiya. 43(4), p 715-720, 1974.

Descriptors: *Bacteria, *Viruses, Distribution, Pollutant identification, E coli, Bioindicators, Microorganisms, Rivers, Parasites, Water pollution, Water purification, Self purification.
Identifiers: *Bdellovibrio-Bacteriovorus, *USSR(Okra River).

Quantitative characteristics of the distribution of B. bacteriovorus were studied in the water of the Okra river (USSR), namely, the ratio between this bacterial parasite and the total content of microorganisms in the water as well as the concentration of Escherichia coli, one of its most widely distributed hosts. The distribution of Bdellovibrio can be a criterion for water contamination. Bdellovibrio is probably one of the active factors participating in water self-purification.--Copyright 1975, Biological Abstracts, Inc.
W76-11551

THE DETERMINATION OF PHENOLS IN WATER: GAS CHROMATOGRAPHIC IDENTIFICATION BY MEANS OF THE ELECTRON AFFINITY, (IN GERMAN),
Mainz Univ. (West Germany). Hygiene Institut.
H. Kunte.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med. 160(2), p 148-154, 1975.

Descriptors: *Pollutant identification, *Phenols, *Gas chromatography, Organic compounds, Analytical techniques.
Identifiers: *Electron affinity(Phenols), Electron capture detector, Flame ionization detector.

The electron affinities for 98 phenolic compounds were determined using an electron capture detector (ECD) and a flame ionization detector (FID). The signals of the 2 detectors were registered simultaneously on a 2-channel recorder by splitting the gas stream at the column outlet for the ECD and the FID (1:1). The peak areas were corrected for equal concentration and instrument parameters and the ratio of peak area (ECD) to peak area (FID) was used as a measure of electron affinity. Among the phenolics found in water there are several groups with high or very high electron affinity, e.g., dichlorophenols, trichlorophenols, tetra- and pentachlorophenol; the values of these compounds are about 100, 1000, 10000, and 30000 times higher, respectively, than that of phenol itself and its alkyl derivatives. For the mono- and dinitrophenols the corresponding figures are between 100 (o-nitrophenol) and 5000 (dinitrophenols). A comparatively high value was found for salicyclic aldehyde: about 250 compared with phenol. The application of these values in the identification of some peaks in the gas chromatogram of a river water extract is demonstrated.--Copyright 1975, Biological Abstracts, Inc.
W76-11552

EFFECT OF THE DEGREE OF VACUUM USED IN FILTRATION ON THE SIMULTANEOUS MEASUREMENT OF ASSIMILATION AND EXCRETION BY PHYTOPLANKTON ORGANISMS, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Abidjan (Ivory Coast). Centre de Recherches Oceanographiques.
For primary bibliographic entry see Field 5C.
W76-11554

PRIMARY PRODUCTION IN THE MAURITANIAN UPWELLING IN MARCH 1973, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Abidjan (Ivory Coast). Centre de Recherches Oceanographiques.
For primary bibliographic entry see Field 5C.
W76-11555

RADIOACTIVITY IN THE MEDITERRANEAN SEA, (IN ITALIAN),
Parma Univ. (Italy). Instituto di Zoologia.
L. T. Pelati, C. Triulzi, and M. G. Mezzadri.
Ateneo Parmense Acta Nat. 11(1), p 171-180, 1975.

Descriptors: *Radioactivity, *Radioisotopes, Sediments, Plankton, Fallout, Strontium radioistopes, Water pollution.
Identifiers: *Cesium-137, *Mediterranean Sea, *Strontium-90.

Some important artificial radionuclides in plankton, water and sediment samples collected in various areas of the Mediterranean Sea were analyzed. Some considerations are drawn on the differences found among Italian seas. The evolution of 137Cs/90Sr ratio from fallout to marine sediments is examined.--Copyright 1976, Biological Abstracts, Inc.
W76-11558

RAPID DETERMINATION OF NO3 IN WATER, (IN ROMANIAN),
Institutul Agronomic, Bucharest (Rumania).
T. Galben, and V. Bucurenciu.
Lucr Stiint Inst Agron Nicolae Balcescu Bucur Ser B. 15, p 415-420, 1972.

Descriptors: *Pollutant identification, *Nitrates, Water analysis, *Colorimetry, Soil analysis.

A simple and rapid method for determining NO3 in water and soil saline extracts was devised. The suggested colorimetric method is based on the oxidation of O-tolidine by water nitrates in a concentrated H2SO4 medium and the formation of yellow

compounds.--Copyright 1976, Biological Abstracts, Inc.
W76-11559

DECREASE OF STRONTIUM-90 CONTENT IN THE TUNDRA SOIL-VEGETATION COVER, (IN RUSSIAN),
Ural Science Center, Sverdlovsk (USSR). Inst. of Plant and Animal Ecology.
For primary bibliographic entry see Field 2K.
W76-11565

STUDY OF THE BEHAVIOUR OF POLIOMYELITIS VIRUS TYPE 1 IN DIFFERENT HYDROUS MEDIA, (IN FRENCH),
Metz Univ. (France).
J. Schwartzbrod, P. Dixneuf, L. Schwartzbrod, J. C. Brochet, and J. M. Foliguet.
Rev Epidemiol Med Soc Sante Publique 23(4/5), p 235-252, 1975.

Descriptors: *Bacteria, *Viruses, *Humus, Water pollution, Water analysis, Organic matter, Statistical studies, Volumetric analysis, Pollutant identification.
Identifiers: Pecornavirus, *Poliovirus, Hydrous media.

Several surveys on natural inactivation of viruses in water were analyzed. The survival life of poliomyelitis virus type 1 was studied in hydrous medium of known composition, well-buffered and devoid of any bacterial contamination, in a similar medium with organic humate-type substances added. The experiment was done at 4C and at room temperature (18-24C). The presence of humate-type substances apparently has no significant influence on the development of poliomyelitis virus type 1. The survival time of the virus in the experiment was an average of 296 days for a storage temperature of 18-24C (much longer than previously described). It was longer in water kept at 4C. Statistical calculations and titrations performed for 550 days indicated that the total disappearance of the virus occurs only after 10-15 yr.--Copyright 1976, Biological Abstracts, Inc.
W76-11569

THE APPLICATION OF 'BIOTIC INDICES' TO THE STUDY OF POLLUTION IN A RIVER WITH CYPRINIDAE, (IN FRENCH),
Station Bioligique des Eyzies (France).
G. Moreau, J. Couffignal, J.-P. Dubreuil, J.-M. Fauconnier, and J. Lancon.
Ann Limnol. 8(1): 71-85. Illus. 1972. (Engl. Ger. summ.).

Descriptors: *Bioindicators, *Benthos, *Invertebrates, *Hydrobiology, Bioassay, Chemical analysis, Pulp wastes, Water pollution, Rivers.
Identifiers: *Cyprinidae, *France(Vezere River).

A hydrobiological profile of the Vezere (France) was drawn up for the lower reaches, from below Terrasson to below Bugue, by calculating 'biotic indices' based on variations in the populations of benthic invertebrates. The results produced evidence for an important disturbance of the fauna within 2 sectors: the 1st sector was a 25 km stretch immediately downstream from a paper-pulp factory; the 2nd section of about 7 km was situated downstream from the 1st zone and its origin, in the absence of all apparent sources of pollution, was hypothetically attributed to a resurgence of water disappearing just downstream from the factory. Physical-chemical analyses were in agreement with these results and indicated that the pollution is of an organic nature. The advantages of the 2 methods, chemical and biological, as well as a proposal for the improvement of the biotic-index method, were discussed.--Copyright 1975, Biological Abstracts, Inc.
W76-11580

ABSORPTION AND ACCUMULATION OF PESTICIDES RESIDUES AND CHLORINATED BIPHENYLS IN BOTH WILD AQUATIC VEGETATION AND RICE IN THE CAMARGUE REGION, (IN FRENCH),
Centre National de la Recherche Scientifique, Arles (France). Centre Ecologie Camargue.
For primary bibliographic entry see Field 5C.
W76-11582

ECOTOXICOLOGY OF CRUDE OILS AND THE USE OF EXPERIMENTAL MARINE ECOSYSTEMS,
Museum National d'Histoire Naturelle, Paris (France). Laboratoire de Physiologie Generale et Comparee.
For primary bibliographic entry see Field 5C.
W76-11586

IDENTIFICATION OF ORGANIC COMPOUNDS IN EFFLUENTS FROM INDUSTRIAL SOURCES,
Versar, Inc., Springfield, Va. General Technologies Div.
E. F. Abrams, D. Derkics, C. V. Fong, D. K. Guinan, and K. M. Slimak.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 641, $7.75 in paper copy, $3.00 in microfiche. Report EPA-560/3-75-002, April, 1975. 172 p, 2 fig, 11 tab, 208 ref, 4 append.

Descriptors: *Waste water treatment, *Pollutant identification, *Biochemical oxygen demand, *Organic compounds, *Water supply, Chemical wastes, Chemical industry, Chemistry, Industrial wastes.

An initial assessment is provided of the possible sources of 154 organic compounds which have been identified in drinking water supplies. Of these, 113 are classified as major pollutants. The most obvious industrial source of organics is the point source discharge of effluents, both treated and untreated. Chlorinating such effluents controls biochemical oxygen demand (BOD) but can create highly unreactive substances. In municipal systems, discharged compounds may become halogenated, be partially or completely degraded, or remain unchanged. Organics emitted as air pollutants may enter surface waters by rainfall. Organic compounds from landfilled solid wastes, sludges, and slurries may leach into groundwater where they may be degraded or interact to produce other organic compounds. Discharges from domestic treatment plants may also be responsible for a variety of chlorinated organics. Chlorination of river water containing organics can produce several halomethanes and haloethanes. Industrial product use, however, appears to be the greatest potential source of organic pollutants, because recovery of product is maximized during manufacture. Sixty-seven of the compounds considered may be formed by various chemical reactions in air, water, or soil. Of the 154 compounds studied, 7 were classified as easily degraded, 17 as degraded without much difficulty, 41 as difficult to degrade, 36 as very difficult to degrade, and 53 as refractory. This distribution is as expected, because less persistant chemicals should be expected to degrade closer to their sources before being detected. (Snyder-FIRL)
W76-11598

AN IMPROVED MODEL FOR ANALYSIS OF AIR AND WATER POLLUTION DATA,
Environmental Protection Agency, Las Vegas, Nev. Office of Research and Development.
For primary bibliographic entry see Field 5B.
W76-11606

DATA MANAGEMENT: KEY TO ENVIRONMENTAL QUALITY ASSESSMENT,
National Oceanic and Atmospheric Administration, Washington, D. C. Environmental Data Service.
For primary bibliographic entry see Field 5G.
W76-11607

A PRACTICAL DATA MANAGEMENT SYSTEM FOR MONITORING AND MANAGING LARGE DISTRIBUTED ECOSYSTEMS,
Michigan State Univ., East Lansing. Dept. of Electrical Engineering and Systems Science.
For primary bibliographic entry see Field 5G.
W76-11608

THE ROLE OF ENVIRONMENTAL DATA BANKS IN ENERGY RESOURCE DEVELOPMENT,
Kentucky Univ., Lexington. Inst. for Mining and Minerals Research.
For primary bibliographic entry see Field 5G.
W76-11609

SAMPLE TRACKING DATA MANAGEMENT SYSTEM,
Environmental Monitoring and Support Lab., Las Vegas, Nev.
For primary bibliographic entry see Field 7C.
W76-11611

QUALITY CONTROL AND HARMONIZATION PROGRAMMES FOR THE ASSESSMENT OF EFFECTS AND THE MEASUREMENT OF ENVIRONMENTAL POLLUTION IN THE EUROPEAN COMMUNITIES,
Commission of the European Communities, Luxembourg. Health Protection Directorate.
For primary bibliographic entry see Field 5G.
W76-11613

VALIDATION OF ENVIRONMENTAL MEASUREMENT METHODOLOGY,
Environmental Monitoring and Support Lab., Cincinnati, Ohio.
J. A. Winter.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 36-5-1 - 36-5-5. 8 fig, 2 tab, 5 ref.

Descriptors: *Quality control, *Water quality, *Analytical techniques, *Evaluation, *Pollutant identification, Measurement, Data processing, *Methodology.
Identifiers: Pyridine-barbituric acid method, Cyanide, Environmental Protection Agency.

The procedure for validating the Environmental Protection Agency's water and waste water data is described. Formal collaborative studies are conducted among federal, state, industrial, laboratories. Samples are prepared in pairs as similar but different concentrates in sealed glass ampuls, and aliquots are added to distilled and natural waste water for subsequent determination by participating laboratories. Differences in the recoveries in these water samples indicate method bias and interferences. Computer programs are used to statistically treat the data and complete the evaluations. The results from these measurements are used to characterize specific analytical methods, to establish precision and accuracy limits for Environmental Protection Agency manuals, and to provide input to formal reports developed by the Agency. Examples of data summaries are provided for the Pyridine-Barbituric Acid Method for total cyanide and cyanide amenable to chlorination in natural waters. (See also W76-10637) (Kreager-FIRL)
W76-11614

5B. Sources Of Pollution

THE MICROBIAL DEGRADATION OF OIL IN THE SEA,
University Coll., Cardiff (Wales). Dept. of Microbiology.
D. E. Hughes, and P. McKenzie.
Proceedings of the Royal Society of London, Biological Sciences, Vol 189, No 1096, p 275-483, 20 May 1975. 9 fig, 1 tab, 39 ref.

Descriptors: *Continental shelf, *Oil spills, *Oil pollution, *Microbial degradation, *Fossil fuels, Resources development, Environmental effects, Water pollution effects, Water resources, Seepage, Nutrients, Alkanes, Aliphatics, Aromatic compounds.
Identifiers: *Outer Continental Shelf, Offshore technology, Crude oils, Environmental impact.

Oil in the sea, whether from natural seepage or spillage undergoes weathering and loses its lighter fractions so that it sinks: emulsification can also take place. Action to remove spillage includes the use of sinking agents or emulsifiers. From the moment oil is released, microbial infection takes place. This leads to further chemical and physical changes in the oil. Depending on the presence of nutrients (nitrogen, phosphate, oxygen) and other factors such as temperature, oil droplet size etc., microbial growth and consequent oil degradation proceeds. In laboratory experiments and some field studies about 40-90% of the oil may degrade. Alkanes and other saturated compounds are the first to be degraded, aromatic and heterocyclic compounds are the first to be degraded, aromatic and heterocyclic compounds follow; no complete stoichiometric account has yet been made. Sinking agents and dispersants may affect the rate and pattern of degradation. (Sinha-OEIS)
W76-11101

TOXIC HEAVY METALS IN GROUND WATER OF A PORTION OF THE FRONT RANGE MINERAL BELT,
Colorado School of Mines Golden. Dept. of Chemistry; and Colorado School of Mines, Golden. Dept. of Geochemistry.
R. W. Klusman, and K. W. Edwards.
Available from the National Technical Information Service, Springfield, Va., 22161, as PB-256 212, $4.50 in paper copy, $3.00 in microfiche. Colorado Environmental Resources Center Fort Collins, June 1976. Completion Report Series No.72. 61 p, 6 fig, 23 tab, 54 ref, append. OWRT A-023-COLO(2).

Descriptors: Arsenic, Cadmium, Copper, Iron, Lead, Manganese, Mercury, Zinc, *Groundwater, *Heavy metals, Water pollution, Mining, Toxicity, Trace elements, *Colorado, *Mineralogy, Public health, Water analysis, *Pollutant identification, *Distribution patterns, Water quality standards.
Identifiers: Front Range mineral belt(Colo), Silver.

A study of toxic trace metal distribution in ground waters of the Front Range mineral belt, Colorado and adjacent areas was completed in order to determine the relationship of water quality to mineralization and the magnitude of potential health effects. Samples were collected and analyzed for arsenic, cadmium, copper, iron, lead, manganese, mercury, silver, znd zinc. Field determinations of pH, Eh, and specific conductance were also made. The samples were divided into two populations; those inside the mineral belt and those outside. Utilizing the observed data distributions, geochemical abundance estimates are made. The data distributions are normalized and corrected for analytical error and determinations below the detection limit, then expressed as a predicted central 95% range for each element in each population. The data are used to determine the probability of ground water exceeding the specified U.S. Public Health Service limit for each constituent.
W76-11105

CHLORIDE MANAGEMENT IN LAKE ERIE BASIN,
State Univ. of New York at Buffalo. Dept. of Civil Engineering.
D. D. Meredith, and R. R. Rumer, Jr.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-256 241 $4.50 in paper copy, $3.00 in microfiche. Water Resources and Environmental Engineering Research Report No. 76-2, June 1976. 65 p, 17 fig, 8 tab, 57 ref. OWRT B-044-NY(3), 14-31-0001-5059.

Descriptors: *Lake Erie, *Chlorides, *Mathematical models, *Simulation analysis, Management, New York, *Deicers, Urban runoff, Salts, Model studies, Lakes, Water pollution sources, Path of pollutants.
Identifiers: Buffalo(NY), *Deicing salts.

The deicing salt runoff from Buffalo, New York and selected nearby communities has been measured and it was found that, in the case of Buffalo, approximately 90% of the deicing salt applied is recovered by the combined sewer system. The Lake Erie drainage basin was subdivided into regions and a search of the literature was made to establish the historical data for chloride discharge from each region. Time-dependent equations were estimated for the annual chloride discharge from each source region and used in conjunction with a mathematical model for chloride balance in Lake Erie. It was possible to fairly reproduce the historical trend of chloride build-up in Lake Erie by this method. The calibrated model projects a chloride concentration in Lake Erie of 137 ppm by the year 2050. The effects of selected salt management programs on future chloride levels in Lake Erie are examined utilizing the model. A simulation model for evaluating effects of deicing salt is developed and applied to a case study of Buffalo, New York. The model simulates the melting of snow due to deicing salt and computes economic costs and benefits. It is shown that the amount of deicing salt used is greater than can be justified economically using the model. The model should be used for helping highway maintenance directors determine an upper limit to the amount of salt that should be used.
W76-11114

MECHANISMS OF LEACHATE FORMATION IN SANITARY LANDFILLS,
University of Southern California, Los Angeles. Environmental Engineering Program.
K. Y. Chen, and F. R. Bowerman.
In: Recycling and Disposal of Solid Wastes, Edited by T. F. Yen Ann Arbor Science Publishers, Inc., Ann Arbor, Michigan, 1974. p. 349-367, 4 fig., 2 tab., 8 ref.

Descriptors: *Landfills, *Solid wastes, Aerobic conditions, Anaerobic conditions, Water pollution sources, *Leachate, Path of pollutants, *Decomposing organic matter, Percolation, Groundwater.
Identifiers: *Anaerobic decomposition.

The percolation of water through a landfill results in a solution with high concentrations of both organic and inorganic compounds, which is generally referred to as leachate. Refuse placed in a sanitary landfill undergoes biological, physical and chemical changes which results in decomposition of the refuse, production of leachate, and production of various gases. Leachate formation is affected by the types of waste material placed in the landfill; the temperature; pH and moisture placed in the landfill; the quality of external sources of water; and the composition of cover soil. Initial decomposition of refuse takes place aerobically. When all the oxygen available is consumed, anaerobic decomposition takes place. After leachate formation, the leachate will migrate in the direction of ground-water flow, with an additional vertical gradient. Ground water will dilute the leachate to some extent. (Gass-NWWA)
W76-11118

FEM COUPLED WITH LP FOR WATER POLLUTION CONTROL,
Hiroshima Inst. of Tech., Itsukaichi (Japan).
T. Futagami, N. Tamai, and M. Yatsuzuka.
Journal of the Hydraulics Division, Proceedings of the American Society of Civil Engineers, Vol. 102, No. HY7, Proceedings paper No. 12244, p 881-897, July 1976. 8 fig, 2 tab, 43 equ, 11 ref.

Descriptors: *Water pollution control, *Finite element analysis, *Linear programming, *Water quality, *Water resources, Assessment, Diffusion, Environmental effects, Planning, Mathematical models, Equations, Systems analysis, Optimization, Discharge(Water).
Identifiers: Double Fourier series.

The finite element (FE) and linear programming (LP) method has been developed in order to solve systems of differential equations with equality or inequality constraints and an objective function. The applicability of the FE and LP method is shown through numerical examples of water pollution problems governed by the convective diffusion equation. The method makes it possible to obtain the optimal discharges from the various types of outfall to meet water quality requirements, and also the distribution patterns of several water qualities in the water basin simultaneously. A new criterion for selecting the locations of outfalls and the optimal volumes of discharged wastewater may be given by the method. In order to check the results of the FE and LP method, an analytical method by the double Fourier series is developed and described briefly. (Bell-Cornell)
W76-11134

ESTIMATING FLOW CONDITIONS FOR RIVER MODELS,
Utah Water Research Lab., Logan.
W. J. Grenney, and D. S. Bowles.
Journal of the Environmental Engineering Division, Proceedings of the American Society of Civil Engineers, Vol. 102, No. EE4, Proceedings paper No. 12297, p 693-707, August 1976. 12 fig, 1 tab, 4 equ, 1 ref.

Descriptors: *Water pollution control, *River flow, *Streamflow, *Water quality, *Water resources, *Management, River basins, Water allocation(Policy), Irrigation water, Computer models, Systems analysis.
Identifiers: Boundary conditions, Mass balances.

River water quality models are important management tools for assessing the impact of point and diffuse pollution loads on the chemical and biological characteristics of the water at various points in a river network. In a river basin, the magnitude of the flow at any point and time is a dominant characteristic affecting pollutant concentrations. Flows from headwaters, surface and subsurface lateral inflow, point loads, and diversions, are input as boundary conditions to water quality models so that the flow at any location on the river network can be computed. This paper describes a 'man-in-the-loop' computer model developed to utilize available historical streamflow data and user judgement to estimate flow boundary conditions for a water quality model. Applications of the model include the efficient allocation of irrigation water, and performing mass balances on any conservative substance, such as salinity. The model has been applied to the Weber River basin, located northeast of Salt Lake City, Utah. (Bell-Cornell)
W76-11136

RESPONSE OF SOUTH PLATTE TO EFFLUENT LIMITATIONS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.

D. W. Hendricks, and M. H. Bluestein.
Journal of the Environmental Engineering Division, Proceedings of the American Society of Civil Engineers, Vol. 102, No. EE4, p 745-768, Proceedings paper No. 12294, August 1976. 11 fig, 7 tab, 7 ref.

Descriptors: *Water quality, *Colorado, *Simulation analysis, *Computer models, *Sewage effluents, Limiting factors, Environmental engineering, Sanitary engineering, River systems, Systems analysis.
Identifiers: *South Platte river systems(Colo), *Federal laws, Systems engineering.

The South Platte river system is typical of many stream systems in the arid west. A computer simulation model has been used to project the water quality improvements resulting from implementation of 1977, 1983, and 1985 effluent quality limitation requirements of PL 92-500 for all waste discharges in the basin. Implementation of Pl 92-500 will result in continued good quality of waters in the mountains zone. The results of the simulation show that sufficient improvements of water quality in the plains zone will be achieved by 1983 to permit fish propagation and recreation. However, improvement in water quality along in the plains zone will result in few benefits at very high cost. Their achievement is essentially precluded by the modifications brought about by intense human uses of the stream and associated lands and by the limiting natural characteristics of the plains system. (Bell-Cornell)
W76-11137

DYNAMIC MODELLING AND CONTROL APPLICATIONS IN WATER QUALITY MAINTENANCE,
Cambridge Univ. (England). Dept. of Engineering.
For primary bibliographic entry see Field 5G.
W76-11142

FUNDAMENTALS OF DRIFT CONTROL BY DROPLET SIZE SELECTION,
Hercules Powder Co., Wilmington, Del. Synthetics Dept.
For primary bibliographic entry see Field 5G.
W76-11148

PHENOXY HERBICIDE RESIDUES AND THEIR PERSISTENCE,
Midwest Research Inst., Kansas City, Mo.
W. B. House, L. H. Goodman, H. M. Gadberry, and K. W. Dockter.
In: Aquatic Plant Control Program: Integrated Control of Alligator Weed and Water Hyacinth in Texas, Army Engineer Waterways Experiment Station, Vicksburg, Miss., Technical Report No. 9, March 1975, p. G3-G15. 50 ref.

Descriptors: *Herbicides, *Pesticide residues, *Persistence, Agronomic crops, Pastures, Vegetation, Public health, Wildlife, Leaching, Aquatic life, Soil types, Weed control, Paraquat, Diquat, Resistance, Water pollution, 2,4-D, 2,4,5-T, Potable water, Degradation(Decomposition).
Identifiers: Phenoxyacetic acids, Silvex, Amitrole.

Crops grown in rotation and subsequent natural vegetation may be injured by residues remaining after herbicide treatment. Human health may also be threatened by accumulations of herbicide residues in plants which are then consumed by animals, birds, and fish. Leaching of herbicides into rivers, lakes and reservoirs can affect aquatic life and water quality. The persistance and residues of herbicides are reviewed. Many factors are involved in herbicide persistance in soils, but temperature, moisture, and soil type are especially important. Preplanting, pre-emergence, and post-emergence applications of herbicide to croplands can be made. Selection of the herbicide depends on weed specificity, speed of herbicide dissipation, and residue carry-over when crops are rotated. Weather conditions also affect the speed of dissipation. Tolerance of the primary and succeeding crops for the herbicide must also be considered. A serious problem involving the effect of herbicide residues and their persistence in the ecosystem involves the possible contamination of water supplies used for human consumption. Watersheds and drainage from cropped areas might cause secondary effects involving the health of domestic animals, wildlife, or aquatic life. Many of the studies described here have been concerned with phenoxyacetic acids and their esters, paraquat, diquat, silvex, and amitrole. (See also W76-11145) (Buchanan-Davidson--Wisconsin)
W76-11151

EFFECT OF TILLAGE SYSTEMS ON RUNOFF LOSSES OF PESTICIDES: A SIMULATED RAINFALL STUDY,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. L. Baker, H. P. Johnson, and J. M. Laflen.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 514, $5.50 in paper copy, $3.00 in microfiche. Completion Report, Iowa State Water Resources Research Institute, Ames, No. ISWRRI-71, June 1976. 98 p. 16 fig., 6 tab., 52 ref., append. OWRT B-050-1A(1) 14-31-0001-5073.

Descriptors: *Cultivation, *Simulated rainfall, *Pesticide residues, Adsorption, Herbicides, Insecticides, Sediments, Water yield, *Nutrient removal, Iowa, Soils, *Path of pollutants, Water loss, *Pesticide drift, Water pollution sources.
Identifiers: Lasso, Bladex, Dyfonate, Alachlor, Cyanazine, Fonofos, *Iowa Corn Belt.

Pesticide losses were measured from small plots subjected to simulated rainfall. The plots are established at three locations in Iowa, each with different soils and slopes. The plots were tilled parallel to the slope by six different tillage practices. One insecticide (fonofos) and two herbicides (alachlor and cyanazine) were applied to the soil at recommended rates shortly before simulating two rains at 6.35 cm/hr and a third at 12.7 cm/hr (totalling 21.6 cm). Concentrations of all three pesticides in both sediment and water sample decreased significantly with time. Pesticide concentrations in water were correlated with percent residue cover. Fonofos concentration in water were so low (avg. 0.014 ppm) that even though much more water than sediment was lost a major carrier was sediment (avg. of 1.8% of the fonofos applied was lost). The ratio of herbicide concentration sediment to that in water (ranged from 5 to 10) was less than the ratio of water to sediment lost; thus, water was the major carrier of the two herbicides. Decreases in herbicide losses from decreased runoff and erosion from plots with conservation tillage practices are negated by higher herbicide concentrations. For alachlor the average loss from all plots was 7.9% of that applied (8.0% for conventionally tilled plots); whereas, the average for cyanazine was 11.0% (9.7% for conventionally tilled plots). Sediment and water loss data as well as nutrient loss data for a companion study are given.
W76-11169

PETROLEUM COMPOUNDS IN THE MARINE FOOD WEB: SHORT-TERM EXPERIMENTS ON THE FATE OF NAPHTHALENE IN CALANUS,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 5C.
W76-11181

ECOLOGY OF THE LITTORAL POLYCHAETE STREPTOSYLLIS WEBSTERI, A NEW SPECIES IN THE BALTIC,
Morski Instytut Rybacki, Gdynia (Poland).
L. Zmudzinski.
OIKOS Supplementum 15, p. 133-134, 1973. 2 fig., 2 ref.

Descriptors: *Benthic fauna, Aquatic animals, *Benthos, Habitats, *Littoral, *Niches, Aquatic life, Salinity, Temperature, *Ecology, *Pollutant identification, Water pollution sources, *Path of pollutants.
Identifiers: *Baltic Sea, Species identification, *Polychaetes, *Streptosyllis websteri.

The polychaete Streotosyllis websteri has been discovered in the southern Baltic and is new to the Baltic. It is an eurythermic (0-18C), polyoxybionthic (4.8-7.8 ml 02/1 in the bottom water) and euryhaline species (from at least 7.5 to 15.0 0/00) and occurs in a narrow band along the Baltic south coast and on some adjacent banks on sandy and gravel grounds, mainly at depths of 10 to 30 m. It probably occurred earlier in western parts of the Baltic, but its presence there was overlooked. It is possible that it occurs along the western and eastern coasts of the central Baltic. (Katz)
W76-11186

EFFECTS OF SULFUR DIOXIDE AND/OR OZONE ON SEVERAL OAT VARIETIES, 1975 ANNUAL REPORT,
North Carolina State Univ., Raleigh.
For primary bibliographic entry see Field 5C.
W76-11190

INHIBITION OF NITRIFICATION BY AMMONIA AND NITROUS ACID,
Monteco Environmental Management Associates, Montgomery, N.Y.
For primary bibliographic entry see Field 5D.
W76-11197

THE ROLE OF CONVENTIONAL WASTEWATER TREATMENT IN COASTAL AREAS,
North Carolina Univ. at Chapel Hill. Wastewater Research Center.
For primary bibliographic entry see Field 5D.
W76-11229

SUMMARY: TECHNOLOGICAL ALTERNATIVES FOR WATER SUPPLY AND WASTEWATER DISPOSAL IN THE COASTAL AREA,
Clemson Univ. S. C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5E.
W76-11230

PROCEEDINGS, SEVENTEENTH CONFERENCE ON GREAT LAKES RESEARCH, PART 1.
For primary bibliographic entry see Field 2H.
W76-11275

CRUSTACEAN ZOOPLANKTON OF SOUTHWESTERN LAKE ONTARIO IN 1972 DURING THE INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES,
State Univ. Coll., Buffalo, N.Y. Great Lakes Lab.
For primary bibliographic entry see Field 2H.
W76-11276

VERTICAL INTERACTIONS IN PHYTOPLANKTON POPULATIONS - AN ASYMPTOTIC EIGENVALUE ANALYSIS,
Manhattan Coll., Bronx, N.Y. Environmental Engineering and Science Graduate Program.
For primary bibliographic entry see Field 2H.
W76-11277

DIELDRIN AND DDT: ACCUMULATION FROM WATER AND FOOD BY LAKE TROUT (SALVELINUS NAMAYCUSH) IN THE LABORATORY,
Bureau of Commercial Fisheries, Ann Arbor, Mich. Great Lakes Fishery Lab.

For primary bibliographic entry see Field 5C.
W76-11279

TEMPORAL AND SPATIAL DISTRIBUTIONS OF PLANKTONIC ROTIFERS IN MILWAUKEE HARBOR AND ADJACENT LAKE MICHIGAN,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
For primary bibliographic entry see Field 2H.
W76-11285

MODELING OF PHYTOPLANKTON IN LAKE ONTARIO,
Manhattan Coll., Bronx, N. Y. Environmental Engineering and Science.
For primary bibliographic entry see Field 5C.
W76-11286

PLUTONIUM DISTRIBUTION IN LAKE MICHIGAN BIOTA,
Argonne National Lab., Ill. Radiological and Environmental Research Div.
For primary bibliographic entry see Field 2H.
W76-11287

PHOSPHORUS MOBILITY IN LAKE ONTARIO SEDIMENTS,
Wisconsin Univ., Madison. Water Chemistry Lab.
R. T. Bannerman, D. E. Armstrong, G. C. Holdren, and R. F. Harris.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 158-178, 1974. 4 fig, 13 tab, 33 ref. EPA R-800609, USDA 12-14-3001-226.

Descriptors: *Phosphorus, *Lake sediments, *Lake Ontario, Inorganic compounds, Phosphorus compounds, Sediments, Sorption, Chemistry, Analytical techniques, Cores, Core drilling, Sampling, Surveys, Lakes, Limnology.
Identifiers: *International Field Year for the Great Lakes, Inorganic phosphorus.

Sediment cores were obtained from 15 lake stations representing the three major basins and the inshore zone of Lake Ontario. Cores were sectioned for characterization of the surface sediments according to inorganic P chemical mobility. Physical mobility was characterized by measurement of P release from intact cores incubated under controlled laboratory conditions. The proportions of potentially chemically mobile inorganic P were usually high (30 to 60%) in the central basin sediments and low (2 to 8%) for the inshore zone sediments. Although the amounts of inorganic P desorbed after three successive equilibrations of Lake Ontario sediments represented only 3 to 17% of the potentially mobile inorganic P, sufficient inorganic P was desorbed to restore a large part of the original interstitial inorganic P concentrations. Interstitial inorganic P (mobile P) concentrations ranged from 14 to 1280 micrograms/liter and were higher than dissolved inorganic P concentrations in the overlying water. Diffusion rates estimated from the range of observed interstitial inorganic P values ranged from about 0.05 to 0.6 mg/sq m/day and were in agreement with the range of 0.03 to 0.8 mg/sq m day estimated from P release rates from intact cores incubated under controlled laboratory conditions. Based on an inorganic P flux of 0.2 mg/sq m/day, the estimated annual contribution of inorganic P to Lake Ontario water is equal to about 10% of the external P loading. (See also W76-11275) (Sims - ISWS)
W76-11288

STUDIES OF PLUTONIUM CYCLING AND SEDIMENTATION IN LAKE MICHIGAN,
Argonne National Lab., Ill. Radiological and Environmental Research Div.
M. A. Wahlgren, and D. M. Nelson.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 212-218, 1974. 3 fig, 1 tab, 20 ref.

Descriptors: *Radioisotopes, *Sediments, *Plankton, *Lake Michigan, Zooplankton, Phytoplankton, Turnovers, Mixing, Lakes, Sampling, Surveys, Suspended solids, Lake sediments, Detritus, Path of pollutants, Radioactive wastes, Sedimentation, Cesium
Identifiers: *Plutonium.

Estimates of cumulative deposition, together with the results of extensive lakewide sampling in 1972, yielded estimates of mean halftimes for removal from the water column of Lake Michigan of 1.0 + or - 0.3 yr for Pu239,240, and 1.4 + or - 0.3 yr for Cs137. However, data from 1971, 1972 and 1973 water samples indicate that the recent half-time is much greater than the 1963-1972 average, presently being on the order of 3 to 4 yrs for both Pu239 and Cs137. The longer turnover time is consistent with the Cs137 turnover time in the water column deduced from analysis of preserved Lake Michigan alewives. Water filtration experiments have demonstrated that greater than 75% of the plutonium is nonfilterable and is present as colloid or sub-colloidal sized fractions. At an offshore station near Grand Haven, Michigan, the concentration of Cs137 in the epilimnion underwent a slight but significant decline from June to November, whereas Pu239 was reduced to a small fraction of its spring value. In net plankton samples dominated by phytoplankton a much lower mean Cs137:Pu239 ratio is observed than in water samples, indicating a preferential sorption of Pu239 over Cs137 by phytoplankton. The results of these experiments suggested that sorption by phytoplankton (and the subsequent rapid settling from the epilimnion of phytodetritus and/or zooplankton fecal pellets) is responsible for the rapid removal of Pu239 from the epilimnion. (See also W76-11275) (Sims - ISWS)
W76-11292

OCCURRENCE OF AS, CD, CO, CR, CU, FE, HG, NI, SB, AND ZN IN LAKE ERIE SEDIMENTS,
Bowling Green State Univ., Ohio. Dept. of Geology.
L. J. Walters, Jr., T. J. Wolery, and R. D. Myser.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 219-234, 1974. 5 fig, 4 tab, 40 ref. OWRT A-032-OHIO(3).

Descriptors: *Heavy metals, *Sediments, *Lake Erie, *Great Lakes, Pollutants, Water pollution, Industrial wastes, Metals, Lake sediments, Cores, Sampling, Harbors, Lakes, Sedimentation.
Identifiers: Heavy metal enrichment.

Ten trace and minor elements (Fe, Cr, Co, Cd, Zn, Ni, Sb, As, Hg, and Cu) were determined in sediment cores from eight stations in Lake Erie. The cores were representative of sediments in the western, central, and eastern basins of the lake and included one core each from the harbors of Cleveland and Buffalo. The results generally showed significant enrichments witin the upper thirty cm of bottom sediment for all metals except iron and cobalt. Each harbor core contained high enrichments of most heavy metals but reflected an individual pollution history. Lower magnitudes of enrichment were found in the open lake cores, which generally decreased going from the western basin toward the eastern basin. The order of enrichment by metal was (from least to greatest): Fe, Co, Ni, As, Cr, Zn, Cu, Sb, Cd, Hg. Mercury dating shows that the heavy metal inputs apparently underwent major increases in the period 1948-1955. Intermittent pollution inputs cause irregular concentration-depth profiles which are probably altered to a minor extent by upward transport of metal in the sediment column via a reaction-diffusion mechanism. In 48% of the cases the top interval of the sediment column showed a decrease in heavy metal content. The order of surface enrichment for the metals correlated with the order of ionization potentials, electron affinities, and electronegativities, and suggested that some chemical process is active in controlling the distribution and concentration of the heavy metals. (See also W76-11275) (Sims - ISWS)
W76-11293

POLLUTANT MERCURY AND SEDIMENTATION IN THE WESTERN BASIN OF LAKE ERIE,
Bowling Green State Univ., Ohio. Dept. of Geology.
T. J. Wolery, and L. J. Walters, Jr.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 235-249, 1974. 5 fig, 2 tab, 41 ref. OWRT A-032-OHIO(4).

Descriptors: *Mercury, *Sediments, *Lake Erie, Sedimentation, Industrial wastes, Sedimentation rates, Pollutants, Water pollution, Water pollution sources, Sampling, Surveys, Cores, Model studies, Mathematical models, Sludge worms, Benthic fauna, Biochemistry.

Mercury concentrations in the sediments of the western basin of Lake Erie generally decrease with depth to a background level. The point at which the background value is reached in a sediment column represents the time (1939) of the first of two major increases in the rate of pollutant-mercury input to the western basin. A second increase in the rate of input correlates with a major plant expansion in the local chlor-alkali industry in 1954. These points of sudden increase of mercury concentration in the mercury-depth profiles have been used to obtain modern sedimentation rates for the bottom sediments of the western basin at a total of 64 stations. The method relies on the extremely high enrichment of mercury over background levels, good historical documentation of industrial inputs, fast dispersal of these inputs over the basin, and the lack of sufficient post-depositional alteration of the mercury depth profile in the study area. Confirmation of the method was found by: (1) internal consistency with respect to the two episodes of increase in input of mercury, (2) good correlation with a less precise chromium method, and (3) correlation with pollen-dated cores. Estimated rates of sedimentation ranged from 0.06 to 1.5 cm/yr in areas of active sedimentation, with a mean rate over these areas of 0.44 cm/yr. A model was proposed in which clean sediment is deposited over a homogeneous mercury reservoir, which loses mercury to the overlying water mass according to first-order kinetics until a critical depth is reached. (See also W76-11275) (Sims - ISWS)
W76-11294

FIELD OBSERVATIONS OF THE DYNAMICS OF HEATED DISCHARGE JETS,
Argonne National Lab., Ill. Energy and Environmental Systems Div.
A. A. Frigo, S. M. Zivi, R. F. King, and E. D. Levinson.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 412-424, 1974. 11 fig, 1 tab, 3 ref. AEC W-31-109-ENG-38.

Descriptors: *Discharge(Water), *Powerplants, *Lake Michigan, Heated water, Cooling water, Temperature, Water temperature, Flow, Jets, Currents(Water), Electric powerplants, Nuclear powerplants, Hydrodynamics, Lakes, On-site in-

vestigations, On-site data collections, *Path of pollutants, *Dynamics.
Identifiers: Temperature oscillations, Discharge jets, Discharge plumes.

Field studies of the dynamics of heated discharge jets were conducted during 1973 at the Point Beach, J. H. Campbell, and Waukegan Power Plants located on Lake Michigan. Measurements of temperature and velocity were made from small boat anchored near the end of the power plant's surface discharge canals. An aluminum bar equipped with fast response thermistor was lowered over the side of the boat so that water temperatures were sensed simultaneously from a water surface to a depth of three meters. A full set of temperatures was sampled every two seconds. Simultaneously, the local water velocity is measured and recorded at similar time intervals. Coherent temperature oscillations were observed with several Celsius degree magnitudes and with periods ranging from 2 min to 20 min, depending on the plant. Oscillations in velocity were observed at the corresponding frequencies, and were coherent with the temperatures. (See also W76-11275) (Sims - ISWS)
W76-11307

A NUMERICAL MODEL FOR THERMAL PLUMES AND RIVER DISCHARGES,
Case Western Reserve Univ. Cleveland, Ohio. Dept. of Earth Sciences.
J. F. Paul, and W. J. Lick.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 445-455, 1974. 17 fig, 1 tab, 18 ref.

Descriptors: *Model studies, *Discharge(Water), *Lake Erie, *Lake Michigan, Rivers, Powerplants, Mathematical models, Flow, Temperature, Water temperature, Lakes, Outlet works, *Thermal pollution, Hydraulics, Hydrodynamics.
Identifiers: *Cuyahoga River(Ohio), Thermal plumes.

A numerical model for the time-dependent, three-dimensional, variable-density flow from a horizontal rectangular discharge into a basin has been developed. Steady-state results were presented for representative flow conditions of the Cuyahoga River entering Lake Erie and of the Point Beach Power Plant thermal discharge into Lake Michigan. Results for three different cases of the Cuyahoga River were given. Two cases were for heated discharge at different flow rates entering a constant depth basin. The lower rate corresponded to flows typical of the late summer months and the higher flow rate corresponded to flows typical of the spring. The third case was for the low flow rate heated discharge entering a variable-depth basin. The depth variation was such that the basin depth doubled in two and one-half river widths and then remained constant. This depth variation was not realistic for the Cuyahoga River, but it was used to indicate the importance of the variable-depth basin. For the Point Beach thermal discharge calculation, the vertical eddy coefficient was assumed to be a function of the local vertical temperature gradient and the actual bottom topography was used. (See also W76-11275) (Sims - ISWS)
W76-11310

MODELING CHLORIDE DISTRIBUTION IN SAGINAW BAY,
Environmental Protection Agency, Gross Ile, Mich. Gross Ile Lab.
W. L. Richardson.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 462-470, 1974. 6 fig, 4 tab, 10 ref.

Descriptors: *Model studies, *Chlorides, *Bays, *Lake Huron, Watersheds(Basins), Mathematical models, Circulation, Water circulation, Water quality, Water pollution, Pollutants, Runoff, Water chemistry, *Path of pollutants.
Identifiers: *Saginaw Bay(Mich).

A steady-state, finite difference model has been structured for Saginaw Bay to analyze average circulation patterns by tracing chlorides through the system. Model inputs include chloride loads from tributaries, segment volumes, segment interface areas and boundary conditions at Lake Huron. The model also requires advection and dispersion transport between adjacent segments which are the 'unknowns'. Model output is the average chloride concentration in each model segment. Initial assumptions of average flow (advection) were made. Although circulation is highly dependent on wind conditions and change rapidly, the type of model employed uses average circulation and considers the highly transient phenomena as part of the dispersion transport. Sensitivity analyses were performed by varying flow and dispersion until a reasonable fit was obtained with the observed chloride concentrations. (See also W76-11275) (Sims-ISWS)
W76-11312

SOURCE IDENTIFICATION OF FUEL OIL SPILLS,
Ontario Ministry of the Environment, Rexdale. Lab. Services Branch.
For primary bibliographic entry see Field 5A.
W76-11314

BACTERIA AND PHOSPHORUS AS INDICATORS OF THE EXTENT OF A LARGE SEWAGE SPILL IN LAKE ERIE,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W76-11315

WATER QUALITY MODEL OF THE LOWER FOX RIVER, WISCONSIN,
Environmental Protection Agency, Anchorage, Alaska. Alaska Operations Office.
D. Crevensten, and A. Stoddard.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 501-513, 1974. 8 fig, 3 tab, 14 ref.

Descriptors: *Model studies, *Water quality, *Dissolved oxygen, *Rivers, *Wisconsin, Mathematical models, Oxygen demand, Biochemical oxygen demand, Chemical oxygen demand, Oxygen, Oxygenation, Reaeration, Dams, Algae, Pollutants, Water pollution, Surveys, Waste disposal, Waste treatment.
Identifiers: *Fox River(Wis), Effluent limits.

A mathematical model describing the interrelationship between the dissolved oxygen concentration of a river and its various sources and sinks has been adapted for use in a study of the Lower Fox River in Wisconsin. The analysis assumes steady-state conditions and described the longitudinal distribution of dissolved oxygen in the river from Neenah-Menasha to Green Bay, a distance of approximately 64.4 km. The sources of dissolved oxygen included in the model are atmospheric reaeration, algal photosynthetic activity, and reaeration over dams. The sinks of dissolved oxygen considered are carbonaceous biochemical oxygen demand, nitrogenous biochemical oxygen demand, sludge oxygen demand, and algal respiration. The model was verified for various conditions of waste loading, river temperature and river flow. The model then was used to evaluate the effect on water quality of implementing interim best practicable control technology effluent limitations for industrial discharges and 90% biochemical oxygen demand removal limitations for municipal sources. The study indicated that implementation of the above effluent limits will result in a significant improvement in water quality in the Lower Fox River. A daily average dissolved oxygen concentration of 4 to 5 mg/l will be maintained under low-flow, summer conditions and will not fall below 4 mg/l more than about 2% of the time during extreme low-flow and high temperature situations. (See also W76-11275) (Sims - ISWS)
W76-11316

A SIMULATION MODEL FOR PHOSPHORUS WASTE DISCHARGES IN THE LAKE ERIE BASIN,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Chemical Engineering.
R. Prober, and P. B. Melnyk.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 514-519, 1974. 4 fig, 1 tab, 5 ref.

Descriptors: *Phosphorus, *Model studies, *Waste disposal, *Lake Erie, Mathematical models, Forecasting, Watersheds(Basins), Water treatment, Waste water treatment, Pollutants, Water pollution, Phosphorus compounds, Nutrients, Nutrient removal, Detergents, Water pollution sources, Chemical wastes, Lakes.

An aggregated simulation model was presented for pollutant generation and wastewater treatment in the Lake Erie watershed. Based on total capacities for treatment, the model calculated daily average discharges into receiving waters as well as total capital and operating costs for treatment. This is done separately for the five watershed sub-basins. Calculated results were presented for planning scenarios for phosphorus control which consist of schedules for: (1) fraction of wastewaters treated, (2) fraction of treated wastewater receiving secondary or advanced treatment, (3) phosphorus content of advanced treatment effluents, and (4) detergent phosphorus usage per capita. One scenario approximates present planning for implementation of advanced treatment and upgrading of conventional facilities. By the mid-1980's, this is predicted to reduce discharges by 30% for solid phosphorus and by 70% for dissolved phosphorus. However, population and economic growth at historic levels would negate these improvements, increasing discharges back almost to 1970 levels by 2020 despite continuing new plant construction and more severe advanced treatment. For comparison, another scenario considers elimination of detergent phosphorus. This, along with planned expansions of conventional treatment, would achieve reductions of phosphorus discharges quite similar to the present planning, but without the costs for advanced treatment. (See also W76-11275) (Sims - ISWS)
W76-11317

CHLORIDE BUILD-UP AND CONTROL IN LAKE ERIE,
State Univ. of New York at Buffalo.
R. R. Rumer, Jr., D. D. Meredith, and C. C. Chien.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 520-534, 1974. 16 fig, 1 tab, 10 ref. OWRT B-044-NY (2), 14-31-0001-5095.

Descriptors: *Chlorides, *Lake Erie, *Model studies, Mathematical models, Forecasting, Sodium chloride, Salts, Deicers, Snow removal, Runoff, Urban runoff, Surface runoff, Water pollution sources, Pollution abatement, Lakes, Water pollution control.
Identifiers: *Buffalo(NY), Chloride balance, Chloride control.

The de-icing salt runoff from Buffalo, New York, and selected nearby communities has been measured. It was found that, in the case of Buffalo, approximately 90% of the de-icing salt applied is recovered by the combined sewer system. The Lake Erie drainage basin was subdivided into regions and a search of the literature was made to establish the historical data for chloride discharge from each region. Time-dependent equations were estimated for the annual chloride discharge from each source region and used in conjunction with a mathematical model for chloride balance in Lake Erie. It was possible to fairly reproduce the historical trend of chloride build-up in Lake Erie by this method. The calibrated model projects a chloride concentration in Lake Erie of 135 ppm by the year 2050. The effects of a few selected salt management programs on future chloride levels in Lake Erie were examined utilizing the model. (See also W76-11275) (Sims - ISWS)
W76-11318

THE EFFECT OF A FOSSIL FUEL POWER PLANT'S COOLING WATER SYSTEM ON THE WATER QUALITY OF GREEN BAY, WISCONSIN,
Wisconsin Univ., Green Bay. Coll. of Environmental Sciences.
J. H. Wiersma, I. K. Iskandar, L. J. Schwartz, R. W. Lanz, and C. C. Weber.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton(Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 535-543, 1974. 2 fig, 4 tab, 18 ref.

Descriptors: *Cooling water, *Powerplants, *Water quality, *Wisconsin, *Lake Michigan, Surveys, Sampling, Bays, Rivers, Temperature, Water temperature, Water cooling, Chemicals, Nutrients, Bacteria, Dissolved oxygen, Trace elements, Water pollution, Water pollution sources, Pollutants.
Identifiers: *Green Bay(Wis), *Fox River(Wis).

During 1973, water samples were collected in duplicate from two separate intakes and the outfall of a 439 megawatt (e) coal-fired power plant located at the confluence of the Fox River and lower Green Bay arm of Lake Michigan. Condenser cooling water for the plant is obtained from both the Fox River and lower Green Bay. Temperature and dissolved oxygen were monitored continuously in the two intakes and outfall. Twenty-two physical-chemical water quality parameters were measured monthly. Bacterial studies were conducted concurrently with the water chemistry studies. Trace elements were determined quarterly. Primary productivity studies were also conducted during summer months in the vicinity of the power plant. Minimum temperature differences between the intakes and the outfall occurred during the critical summer months and maximum temperature changes during the very cold months of the year. No significant losses of dissolved oxygen were found in the condenser discharge water but super-saturation occurred during the spring, primarily in April. The intake waters were generally high in nutrients (especially phosphorus) and turbidity. For most parameters the composition of the outfall water did not vary significantly from that of the intakes. However, sporadic significant changes were detected in ortho-phosphorus, total phosphorus, nitrite, turbidity, conductivity, ammonia, total silica, and iron. Bacterial populations in the intake and discharge waters of the electric generating plant varied widely. The heated discharge water alone had little or no effect on either the bacterial populations or primary productivity. (See also W76-11275) (Sims - ISWS)
W76-11319

A SIMULATION MODEL FOR LONG-TERM FORECASTING OF WASTE LOADINGS FROM POPULATION, LAND USE, AND ECONOMIC ACTIVITIES IN THE GREAT LAKES BASIN,
Canada Centre for Inland Waters, Burlington (Ontario),
D. E. Coleman, J. P. H. Batteke, and S. Madras.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 544-548, 1974. 5 fig, 4 ref.

Descriptors: *Model studies, *Forecasting, *Water quality, *Economics, *Great Lakes, Mathematical models, Land use, Population, Economic prediction, Economic impact, Waste disposal, Social aspects, Social impact, Lakes, Pollutants, Technology, Social values, Simulation analysis, Computer models.

The water quality of the Great Lakes is a time-lagged reflection of human and other natural activities in the basin. Whereas levels of waste loadings and economic activities are well correlated, changes in people's attitudes towards water quality will, in the long run, affect the nature of this correlation in many different ways. Traditionally, one forecasting technique has employed statistical methods based on extrapolation of curves fitted to historical data and multiple regressive techniques for estimating equations. Such an approach could be called naive for longterm forecasting purposes because it does not handle adequately the causal relationships and interactions among the numerous economic, social and technical parameters. If the nature of the causal mechanism changes, forecasting errors will result. However, changes in the causal relationships are the essence of the long-term forecasting problem. The alternative approach to forecasting, the use of a dynamic simulation model, provides much more flexibility in that it allows incorporation of gradual changes in social and economic 'constraints'. Also, this methodology permits the introduction of descriptive knowledge, in addition to numerical knowledge. The emphasis is on explaining interactions by means of feedback loops in quantitative terms, rather than on providing rigidly qualified statistical results. The simulation model provides a reliable extension to intuitive reasoning. (See also W76-11275) (Sims - ISWS)
W76-11320

AN ECONOMETRIC FORECASTING MODEL FOR THE MAJOR METROPOLITAN AREAS IN THE LAKE ERIE BASIN,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Economics.
M. D. McCarthy, and C. Loxley.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 574-586, 1974. 6 tab, 3 ref.

Descriptors: *Model studies, *Econometrics, *Water pollution, *Lake Erie, Mathematical models, Simulation analysis, Forecasting, Population, Economics, Employment, Economic impact, Water quality, Phosphorus, Cities, Wages, Water pollution sources.
Identifiers: *Econometric forecasting models, *Cleveland(Ohio), Manufacturing.

An econometric model has been developed that can forecast and simulate long-run economic trends for the major standard metropolitan statistical areas (SMSAs) in the Lake Erie Basin. Its design is such that it can be made part of an intergrated modelling approach to phosphorus pollution in Lake Erie. The strategy adopted is to apply a dynamic aggregate general model to the major metropolitan area within each water-resource area. This approach is thus a relatively inexpensive way to deal with such a large area given the available data base. The analysis starts by presuming that aggregate U.S. economic trends are the principal determinant of manufacturing output and employment. The regional model is therefore linked to, and driven by, forecasts for the U. S. taken from an available national econometric model. then non-manufaturing employment and total population are determined from local behavioral relationships. The paper described the algebraic structure of an abstract general metropolitan model, and presented details of its application to the Cleveland SNSA and the extrapolation of results to the Southern Lake Erie area. The estimates for each equation were presented along with graphs illustrating their performance, and the results of the complete model simulation were discussed. (See also W76-11275) (Sims - ISWS)
W76-11322

PHOSPHORUS CYCLING AND LUXURY PHOSPHORUS STORAGE BY ALGAE IN THE WATERS OF GREEN BAY,
Wisconsin Univ., Green Bay. Coll. of Environmental Sciences.
For primary bibliographic entry see Field 5C.
W76-11332

HOW TO DISPOSE OF TOXIC SUBSTANCES AND INDUSTRIAL WASTES,
Noyes Data Corporation, Park Ridge, N.J.
For primary bibliographic entry see Field 5E.
W76-11368

AN EXPERIMENTAL HIGH-ASH PAPER MILL SLUDGE LANDFILL,
Michigan State Univ., East Lansing.
For primary bibliographic entry see Field 5E.
W76-11379

AGRICULTURE AND CLEAN WATER--PROCEEDINGS OF A CONFERENCE TO EXPLORE CONTROL STRATEGY FOR AGRICULTURAL NONPOINT SOURCE WATER POLLUTION.
For primary bibliographic entry see Field 5G.
W76-11406

BENEATH THE TENN-TOM,
Geological Survey, Nashville, Tenn.
For primary bibliographic entry see Field 4A.
W76-11415

GROUND-WATER FLOW AND POLLUTION AT A WELL FIELD, OLEAN, NEW YORK,
Geological Survey, Albany, N. Y.
A. D. Randall.
Open-file Report 76-397, June 1976. 21 p, 10 fig, 4 tab, 6 ref.

Descriptors: *Water pollution sources, *Groundwater, *Water wells, *Path of pollutants, *Groundwater movement, Aquifer characteristics, Pumping, Drawdown, Water quality, Sampling, Nitrogen compounds, *New York, Monitoring.
Identifiers: Olean(NY), Well field.

From September 1970 through October 1975, the U. S. Geological Survey investigated and monitored ground-water pollution at a well field in Olean, N. Y. Ground-water withdrawal at North Olean has created a cone of depression as deep as 30 feet. Ground water near the well field has been polluted by petroleum, hexavalent chromium and, most recently, nitrogen compounds. The apparent source of the nitrogen compounds is near land surface in a small area nearly 2,000 feet southwest of the center of the well field. From 1970 to 1974, concentrations of ammonia plus nitrate have regularly exceeded 2,000 mg/liter as nitrogen in water from three test wells. All of the nitrogen-bearing water flows toward the center of the well field and is eventually withdrawn by wells. If all pumping near North Olean were to cease, 4 to 8 months might be required to fill the cone of depression;

thereafter the polluted water would move gradually to the south or southwest at a rate of roughly 4,500 feet in 12 years. (Woodard-USGS)
W76-11417

ANALYSIS OF SELECTED BENTHIC COMMUNITIES IN THE FLORIDA EVERGLADES WITH REFERENCE TO THEIR PHYSICAL AND CHEMICAL ENVIRONMENT,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5A.
W76-11418

PROCEEDINGS, SEVENTEENTH CONFERENCE ON GREAT LAKES RESEARCH, PART 2.
For primary bibliographic entry see Field 2H.
W76-11424

IFYGL STREAM MATERIALS BALANCE STUDY,
Environmental Protection Agency, Rochester, N. Y.
D. J. Casey, and S. E. Salbach.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 668-681, 1974. 9 fig, 3 tab, 8 ref.

Descriptors: *Streams, *Chemicals, *Runoff, *Lake Ontario, Lakes, Rivers, Sampling, Surveys, Phosphorus, Nitrogen, Chlorides, Nitrates, Sulfates, Metals, Materials, Pollutants, Water pollution sources, Nutrients, Precipitation(Atmospheric), Chemistry, *Path of pollutants.
Identifiers: *International Field Year for the Great Lakes, Materials balance.

A report is presented of the results of studies conducted as part of the International Field Year Great Lakes by the U. S. Environmental Protection Agency and the Ontario Ministry for the Environment to determine the amount of materials entering and leaving Lake Ontario. Owing to budget considerations and hydrologic differences, the Canadian and U. S. programs differed in regard to the frequency of stream sampling and, to some extent, in regard to parameters measured. The paper addressed mean annual loadings to Lake Ontario for total phosphorus, soluble phosphorus, ammonia, total nitrogen, nitrate, sulfate and various metals. A materials balance budget for total phosphorus, total nitrogen, and chloride for lake Ontario has been calculated. The problem of determing what frequency of stream sampling would produce the best results was discussed. (See also W76-11424) (Sims - ISWS)
W76-11429

HEAVY MINERALS IN THE SANDS OF SOUTHERN AND EASTERN LAKE ONTARIO,
Rochester Univ. N. Y. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2J.
W76-11431

PHOSPHATE, ALGAE, AND TACONITE TAILINGS IN THE WESTERN ARM OF LAKE SUPERIOR,
Texas Univ. at Dallas. Richardson. Inst. for Environmental Sciences.
For primary bibliographic entry see Field 5C.
W76-11441

A MODEL FOR THE STUDY OF EPISODES IN THE DISPERSION OF A CONSERVATIVE POLLUTANT IN LAKE MICHIGAN,
Illinois Univ., at Chicago Circle, Chicago. Dept. of Information Engineering.
G. M. Schwab, and P. L. Katz.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, New York, p 837-845, 1974. 5 fig, 1 tab, 15 ref.

Descriptors: *Model studies, *Pollutants, *Dispersion, *Lake Michigan, Water pollution, Lakes, Nutrients, Circulation, Water circulation, Mixing, Winds, Simulation analysis, Mathematical models, Water quality, *Path of pollutants, Thermal stratification, Limnology.
Identifiers: *Pollutant dispersion.

Simulation of a conservative pollutant's two dimensional dispersion in vertically stratified (summer) Lake Michigan, using circulation patterns from an existing model, makes possible the study of short term pollution episodes. Discharges may be traced from one or more sources, for a variety of sequences of wind forcing. The finite difference scheme strictly conserves pollutant mass, even if the underlying circulation patterns contain possible inconsistencies. Dispersion of a hypothetical conservative pollutant for an actual 125 day period was simulated using U. S. Weather Service wind histories and using USEPA 'STORET' chloride discharge data for 28 sources to represent typical discharge levels. In addition, 'best' and 'worst' cases were demonstrated, for 33 day episodes following the assumed discharge of a single 'slug' of pollutant into Calumet Harbor, using two actual 33 day wind histories from 1970-71. Wind and resulting circulation histories have a marked effect on pollutant dispersion. Under (worst case) variable wind conditions, even a single 'slug' discharge can result in several weeks of concentration buildup in adjacent nearshore regions. Under (best case) constant winds, the flushing action of coastal jets prevents such a buildup. This has implications in terms of water quality standards for pollutant discharges into large lakes. (See also W76-11424) (Sims - ISWS)
W76-11442

THE DISPERSION OF POLLUTANTS BENEATH OPEN CHANNELS,
California Univ., Santa Barbara. Dept. of Mechanical and Environmental Engineering.
J. C. Bruch Jr., and P. Smith.
Water Air Soil Pollut. 2(1), p 23-34, 1973.

Descriptors: *Dispersion, Open channel flow, Channels, Pollutants, Seepage, Porous media, Flow, *Path of pollutants, Capillary fringe.
Identifiers: Lateral-longitudinal dispersion.

An experiment and a numerical scheme which combine previously given methods for the dispersion and seepage phenomena were presented to describe the dispersion of a pollutant in porous media beneath a triangular channel. The combined effect of longitudinal and lateral dispersion was considered. Numerical concentration profiles are given along with a comparison of experimental and numerical data. The technique suggested can be extended to other channel shapes and flow fields accounting for the capillary fringe.--Copyright 1974, Biological Abstracts, Inc.
W76-11443

PARTICULATE RESIDENCE TIMES,
Atmospheric Environment Service, Toronto (Ontario).
For primary bibliographic entry see Field 5A.
W76-11450

FALLOUT 137CS IN THE SOILS AND SEDIMENTS OF THREE SMALL WATERSHEDS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
J. C. Ritchie, J. R. McHenry, and A. C. Gill.
Ecology. 55(4), p 887-890, 1974.

Descriptors: *Radioisotopes, *Mississippi, *Watersheds(Basins), Distribution patterns, Path of pollutants, Grasses, Crops, Forests, Erosion, Soils, *Sediments.
Identifiers: *Cesium-137.

A budget for the distribution of fallout 137Cs was calculated for 3 small watersheds in northern Mississippi. The cover in 1 contributing watershed is predominantly forest, in the 2nd it is predominantly grass, and in the 3rd predominantly grass and crops. Of the total 137Cs input, 97%, 88% and 85% remained in the forest, the grass and the grass-crop watersheds. The concentration of 137Cs per unit area in the reservoir sediments was 2.8, 3.8 and 4.0 times that of the soils from the respective contributing watersheds, indicating that the reservoirs are acting as 'traps' for 137Cs. Of the 137Cs eroded from the 3 contributing watersheds, 57%, 38% and 25% was found in the respective sediments. The calculated loss of 137Cs per unit area was: eroded soils > croplands > grass > forest.--Copyright 1975, Biological Abstracts, Inc.
W76-11453

DOCUMENTATION FOR ES001. A STEADY-STATE, ONE DIMENSIONAL, ESTUARINE WATER QUALITY MODEL,
Environmental Protection Agency, New York. Region II.
S. C. Chapra, and S. Gordimer.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-246 847, $7.75 in paper copy, $3.00 in microfiche. Environmental Protection Agency Final Report No. ES001, September 1973. 224 p, 11 ref, append.

Descriptors: *Computer programs, *Estuaries, *Water quality, *Biochemical oxygen demand, *Dissolved oxygen, Mathematical models, Water resources, Resource development, Model studies.

ES001 is a computer program which can be used to simulate tidally averaged one dimensional steady-state estuarine systems and predict water mathematical model of an estuarine system. The basic approach used in ES001 is the law of conservation of mass. The model presented is specifically applied to the BOD-DO deficit system, however analogous systems of sequential reactions of two substances, or single systems under first order kinetics may also be modelled. ES001 is presently programmed for use on the IBM 370 while ES002 is compatible with an IBM 1130 system. ES001 is capable of modelling general one-dimensional estuarine systems for a variety of substance concentrations. The program requires segmentation of the system being modelled into sections within which the various geomorphological, physical and hydrological parameters of the estuary are constant. The sections are then connected mathematically, the junction points of these segments being boundary points where these parameters can change. Several types of junctions are allowed including triple junctions, dams, etc., which in combination allow the modelling of numerous types of configurations. The model is assumed to be at steady state and to be tidally averaged. Steady state means that the variables and parameters describing a system do not vary with time. Finally, reaction kinetics are assumed to be of the first-order for the reasons that many substances reacting in an estuary approximate this type of behavior. (Sinha - OEIS)
W76-11460

RANDOM MODEL OF EVAPORATION OF OIL AT SEA,
Mathematica, Inc., Philadelphia, Pa.
M. H. Fallah, and R. M. Stark.
The Science of the Total Environment, Vol 5, No 1, p 95-109, January 1976. 10 fig, 6 ref.

Descriptors: *Continental shelf, *Oil spills, *Oil pollution, *Resources development,

*Environmental effects, *Water pollution sources, *Evaporation, Model studies.
Identifiers: *Outer Continental Shelf, Oil slicks.

When oil is spilled at sea, a portion of it evaporates. The amount depends upon the oil's physical properties and environmental conditions. This paper explores the effect of a random environment on the evaporation process. A random model is developed to predict the residual volume of oil as a function of elapsed time, initial oil volume and its physical properties, and random environmental factors (wind speed and ambient temperature). A simple example illustrates application of the model. Also, a simulation illustrates the effects of random wind speeds on the residual volume and area of the oil slick as a function of time. (Sinha - OEIS)
W76-11462

MODELING THE FATES OF METALS IN OCEAN-DISCHARGED WASTEWATERS,
Southern California Coastal Water Research Project, El Segundo.
T. J. Hendricks, and D. R. Young.
Southern California Coastal Water Research Project Report No. TM 208, Jan 1974. 32 p, 12 fig, 4 tab, 7 ref.

Descriptors: *Continental shelf, *California, *Waste disposal, *Metals, *Water pollution sources, *Waste water(Pollution), Coasts, Sediments, Water resources, Model studies, *Path of pollutants.
Identifiers: Outer Continental Shelf, *Ocean dumping.

Numerical models of the deposition of wastewater particulates and the mobilization of trace metals associated with the particulates were used to examine the fates of five metals (copper, zonc, chromium, lead, and cadmium) present in the submarine wastewater discharges of the Los Angeles County Sanitation Districts. The models predicted that the effluent-related deposition rates will exceed natural sedimentation rates for distances of up to 8 km from the outfalls and account for more than 80 percent of the variation in the metal concentrations observed in the sediments of this area. A discontinuity in the sediment metal distributions at about 3 km from the outfall was revealed by the models; this discontinuity was interpreted as the boundary between aerobic and anaerobic sediments and the position of a corresponding change in the metal mobilization rates. These predictions were compatible with earlier measurements of the physical, chemical, and biological characteristics of the sediments. The models also predicted that, although 90 percent of the metals discharged through the outfall system are associated with particulates, only 10 percent of the metals in the effluent would be retained in the nearby sediments. This prediction agreed with a budget estimated using a different technique. Most of the sewered wastewaters from the coastal regions of southern California are eventually discharged into the ocean. The major discharges, totaling approximately 1 billion gallons per day undergo a minimum of primary treatment prior to their introduction into the ocean through submerged outfalls terminating at a depth of about 200 feet. (Sinha - OEIS)
W76-11464

BUREAU OF LAND MANAGEMENT'S ENVIRONMENTAL STUDIES PROGRAM FOR THE SOUTH ATLANTIC OUTER CONTINENTAL SHELF AREA. CONFERENCE/WORKSHOP PROCEEDINGS,
Research Triangle Inst., Research Triangle Park, N. C.
For primary bibliographic entry see Field 6G.
W76-11474

SOUTHEAST COASTAL RESEARCH ACTIVITIES OF ERDA,
Division of Biomedical and Environmental Research (USERDA), Washington, D. C.
For primary bibliographic entry see Field 6G.
W76-11477

OFFSHORE OPERATIONS, REGULATION AND ENVIRONMENTAL PROTECTION,
Exxon Co., New Orleans, La. Southeastern Div.
For primary bibliographic entry see Field 6G.
W76-11480

OVERVIEW OF CONFERENCE PROGRAMS,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 6G.
W76-11481

GEOLOGICAL OCEANOGRAPHY CONSIDERATIONS,
Duke University, Durham, N. C.
For primary bibliographic entry see Field 6G.
W76-11482

PHYSICAL OCEANOGRAPHY CONSIDERATIONS,
State Univ. System of Florida Inst. of Oceanography, St. Petersburg.
For primary bibliographic entry see Field 6G.
W76-11483

CONCLUSION AND RECOMMENDATIONS CONFERENCE/WORKSHOP,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 6G.
W76-11485

TRANSVERSE DISPERSION IN PARTIALLY STRATIFIED TIDAL FLOW,
California Univ., Berkeley. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W76-11486

FEASIBILITY OF MODELLING THE INFLUENCES OF PIT RECHARGE ON GROUNDWATER LEVELS AND QUALITY IN ALLUVIAL BASINS,
Water Resources Research Center, Tucson.
For primary bibliographic entry see Field 2F.
W76-11487

NON-POINT SOURCE WATER QUALITY MONITORING, INYO NATIONAL FOREST, 1975,
California University, Los Angeles, Environmental Science and Engineering.
For primary bibliographic entry see Field 5A.
W76-11492

AN ENVIRONMENTAL ASSESSMENT OF IMPACTS OF COAL DEVELOPMENT ON THE WATER RESOURCES OF THE YAMPA RIVER BASIN, COLORADO AND WYOMING--PHASE-II WORK PLAN,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 5C.
W76-11500

THE PROBLEM OF MERCURY IN THE MEDITERRANEAN, (IN FRENCH),
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
M. Aubert.
Rev Int Oceanogr Med. 37/38, p 215-231, 1975.

Descriptors: *Mercury, *Sediments, *Biomass, *Pollutant identification, *Path of pollutants, *Distribution patterns, Measurement, Water pollution effects.
Identifiers: *Mediterranean Sea.

Measurements of Hg in waters, sediments and biomass of the Mediterranean Sea and the geographic distribution of Hg as a function of origins and hydrobiologic mechanisms leading to that contamination are presented. From that data and some physiopathological considerations based on studies in other seas, the prospective dangers of Hg contamination to local fish-eating populations are delineated.--Copyright 1975, Biological Abstracts, Inc.
W76-11531

QUANTITATIVE CHARACTERISTICS OF DISTRIBUTION OF BDELLOVIBRIO BACTERIOVORUS IN RIVER WATER, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Biochemistry and Physiology of Microorganisms.
For primary bibliographic entry see Field 5A.
W76-11551

A STUDY OF THE QUALITY OF SILK REELING WATER IN REGARD TO SOLUBILITY OF COCOON-SERICIN, (IN JAPANESE),
Ministry of Agriculture and Forestry, Tokyo (Japan). Sericultural Experiment Station.
S. Bito.
Bull Seric Exp Stn (Tokyo). 25(6), p 371-583, 1973.

Descriptors: *Water quality, *Cation exchange, Conductivity, River, Water wells, *Alkalinity, Hardness(Water), Industrial wastes, *Correlation analysis, Coagulation, *Regression analysis, Salts, Mixing, *Solubility.
Identifiers: Cocoon-sericin, Conductivity, *Japan, *Silk reeling water, Aluminum salts.

The silk reeling region in Japan was divided into 8 zones, the quality of the reeling water of mills, including the river and well water of the environment, was chemically investigated. The quality of water in the 8 zones was compared. Some characteristics of the river and well water (including alkalinity, electro conductivity and hardness) are enumerated. The solubility of cocoon-sericin was investigated in all reeling waters and abnormal quality zones identified. Correlation in factors of water quality was analyzed for rivers and wells in all zones. Correlation between the solubility of cocoon-sericin and other factors of water quality are drawn, and coefficients of correlation presented. Multiple regression analysis was attempted on the relation between the solubility of the cocoon-sericin and factors of water quality; alkalinity is the main contributing factor for the sericin solubility. Regression equations were set up to estimate sericin solubility with respect to alkalinity. Improvements on abnormal water vis-a-vis solubility of cocoon-sericin were examined; good results have been obtained toward regulation of solubility of the rough cation-exchange, coagulation by aluminum salts, and mixing with water of different alkalinity.--Copyright 1975, Biological Abstracts, Inc.
W76-11557

RADIOACTIVITY IN THE MEDITERRANEAN SEA, (IN ITALIAN),
Parma Univ. (Italy). Instituto di Zoologia.
For primary bibliographic entry see Field 5A.
W76-11558

MASS DESTRUCTION OF SYNTHLIBORAMPHUS ANTIQUUS BY OIL POLLUTION OF JAPAN SEA,
Niigata Prefecture (Japan). For. Div.
For primary bibliographic entry see Field 5C.
W76-11562

CONTAMINATION OF THE SEA, (IN SPANISH),
For primary bibliographic entry see Field 5C.
W76-11564

CHARACTERISTICS OF THE QUALITY OF IRRIGATION WATER ON THE BAGAEVSK-SADKOVSK IRRIGATION SYSTEM, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Soil Science.
B. G. Rozanov, and M. A. Abdel'Mottalib.
Biol Nauki (Mosc) 18(1), p 114-118, 1975.

Descriptors: *Water quality, *Irrigation water, Rain, Irrigation systems, Evaporation, Sodium, Drainage, Potassium, Chlorides, Ions, Groundwater, Sulfates.
Identifiers: *USSR(Don River).

Rain, irrigation, drainage and ground waters and their evaporites of the Bagaevsk-Sadkovsk irrigation system supplied from the Tsymlyansk reservoir on the Don River in the Russian SFSR (USSR) were studied. As the water flows from the reservoir to the drainage outlet its composition changes considerably. The concentration of Na, K, Cl and sulfate ions changes as a result of evaporation and Ca and Mg ions as a result of interaction with the solid phase of the soils.--Copyright 1976, Biological Abstracts, Inc.
W76-11566

CERTAIN ASPECTS OF THE PROCESS OF ENTEROVIRUS INACTIVATION WITH CHLORINE, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR)
For primary bibliographic entry see Field 5F.
W76-11568

STUDY OF THE BEHAVIOUR OF POLIOMYELITIS VIRUS TYPE 1 IN DIFFERENT HYDROUS MEDIA, (IN FRENCH),
Metz Univ. (France).
For primary bibliographic entry see Field 5A.
W76-11569

POLLUTION IN THE EFFLUENTS OF BRACCIANO LAKE AND IN ARRONE STREAM, ON THE BASIS OF THE DISTRIBUTION OF SIMULIIDAE, CHIRONOMIDAE, CULCIDAE AND OTHER DIPTERA, (IN ITALIAN),
Istituto Superiore di Sanita, Rome. (Italy). Laboratori di Parassitologa.
G. Di Delupis, M. Dojmi, L. Noccioli, L. Rovosecchi, and M. Scanga.
Riv Parassitol 34(4), p 311-320, 1973.

Descriptors: *Diptera, Distribution, Effluents, Lakes, Streams, Biochemical oxygen demand, Nitrates, Ammonia, Oxygen, Water pollution effects, Bioindicators, Larvae.
Identifiers: Anopheles-Claviger, Arrone stream(Italy), Bracciano, Culex-Pipiens, Culicidae, Orthocladinae, Pupae, Simuliidae, Simulium-Galeratum, Tanipidynae, Wilhelmia-Aureum, Wilhelmia-Latipes, Wilhelmia-Ornata, *Italy(Bracciano Lake).

Collecting places (12) in effluents of Bracciano Lake and height collecting places in Arrone Stream (Italy) were examined for aquatic dipterous larvae, during 4 summer months. Various chemical and physical examinations were performed. The distribution in the 20 collecting places of larvae and pupae of Chironomidae (Chironominae, Tanipodynae, Orthocladinae), Culcidae (Culex pipiens, Anopheles claviger), Simuliidae (Wilhelmia latipes-group W. aurem-group, W. ornata-group, and Simulium galeratum) are reported. The summer values of biological oxygen demand (BOD5) saturated O2, NH3 and NaNO3 are presented. Aquatic larval Diptera, especially Simuliidae, Chironomidae and Culcidae, may be used as ecological indicators.--Copyright 1976, Biological Abstracts, Inc.
W76-11570

HYGIENIC PROBLEMS OF LARGE ANIMAL CONFINEMENT,
Universitaet Hohenheim (Landwirtschaftliche Hochschule). (West Germany). Animal Health Dept. (I).
For primary bibliographic entry see Field 5G.
W76-11571

PHYSICO-CHEMICAL PARAMETERS OF THE HYDROGRAPHIC SYSTEM OF LAKE NANTUA: RELATION WITH OSCILLATORIA, (IN FRENCH),
Station d'Hydrobiologie Continentale, Thonon-les-Bains (France).
For primary bibliographic entry see Field 5C.
W76-11575

THE APPLICATION OF 'BIOTIC INDICES' TO THE STUDY OF POLLUTION IN A RIVER WITH CYPRINIDAE, (IN FRENCH),
Station Bioligique des Eyzies (France).
For primary bibliographic entry see Field 5A.
W76-11580

THE DISTRIBUTION OF NUTRIENT SALTS IN THE MORLAIX BAY (FINISTERE, FRANCE): THE ROLE OF BENTHIC ALGAE, (IN FRENCH),
Brussels Univ. (Belgium). Lab. of Oceanography.
G. T. Houvenaghel.
Hydrobiologia 47(1), p 13-29, 1975.

Descriptors: *Algae, Bays, *Nutrients, *Salts, Benthos, Primary productivity, Salinity, Rivers, Silica, Dissolved solids, *Distribution, Path of pollutants.
Identifiers: *France(Morlaix Bay), English Channel.

A hydrologic profile of Morlaix Bay and River, carried out during the spring under favorable weather conditions, showed weak salinity gradients. The distribution of nutrient salts indicated the presence of 2 distinct zones: an estuarian zone, characterized by high production and large consumption of dissolved silica; and the bay zone, indicative of the activity of benthic macroscopic algae, which are responsible for 80% of the total consumption. Consumption levels suggested that water remained, at a minimum, 2 days in the estuary and 3 in the bay. Given the large volume of water required to maintain benthic and pelagic primary production, it is the English Channel that determines the biotic conditions of the bay.--Copyright 1976, Biological Abstracts, Inc.
W76-11583

LIPID COMPOSITION OF SURFACE FILMS, AND ZOOPLANKTON FROM THE EASTERN MEDITERRANEAN,
Institute of Oceanographic Sciences, Wormley (England).
R. J. Morris.
Marine Pollution Bulletin Vol. 5, No. 7, 1974. p. 105-109, 2 tab., 1 fig., 31 ref.

Descriptors: *Oily water, *Oil pollution, *Zooplankton, *Lipids, *Oil spills, Oil, Oil-water interfaces, Path of pollutants, Water analysis, Crustaceans, Fish, Surfaces, Films, Organic compounds.
Identifiers: *Mediterranean, *Petroleum hydrocarbons, *Tar balls, Tissue analysis, *Surface films, Biological concentration.

The natural surface films in the Eastern Mediterranean appear to be badly polluted with petroleum hydrocarbons, and sub-surface oil/water emulsions are also important contributors to the interface chemistry in certain areas. High levels of non-natural hydrocarbons are present in the lipids of some near-surface zooplankton from this region, suggesting that these animals store and concentrate the pollutant hydrocarbons. (Katz)
W76-11585

ORGANIC POLLUTION IN ENSENADA BAY, MEXICO,
Centre d' Oceanographie, Marseille (France). Station Marine d'Endoume.
M. L. Lizarraga-Partida.
Marine Pollution Bulletin Vol. 5, No. 7, 1974. p. 109-112. 2 tab., 2 fig., 6 ref.

Descriptors: Marine animals, *Benthos, *Organic wastes, *Annelids, *Domestic wastes, *Food processing industry, Organic loading, Industrial wastes, Molluscs, Gastropods, On-site investigations, Invertebrates, Bays, *Mexico, *California, Waste disposal, *Path of pollutants.
Identifiers: *Ensenada Bay(Mex), Baja(Calif), *Polychaetes.

Little attention has so far been paid to the effects of pollution on the Mexican coast. Pollution has become serious in a few industrial areas and attention is now being paid to the effect of discharging organic wastes into the sea at the important tourist center of Ensenada in Baja, California. As in other studies conducted at Los Angeles and Marseille, it has been found that the distribution of polychaete worms in the seabed is a valuable index of the state of health of the sea. (Katz)
W76-11587

PCB LEVELS IN CLYDE MARINE SEDIMENTS AND FAUNA,
Clyde River Purification Board, Glasgow (Scotland).
W. Halcrow, O. W. MacKay, and J. Bogan.
Marine Pollution Bulletin, Vol, 5, No. 9, 1974, p. 134-136, 2 tab., 3 fig., 11 ref.

Descriptors: *Polychlorinated biphenyls, *Sewage pollution, *Sediments, *Sluge disposal, *Sewage sluge, *Benthos, Water pollution effects, Bottom sediment, Benthic organisms, Pathology, Molluscs, Estuaries.
Identifiers: Sediment analysis, *Tissue analysis, *Chlorinated hydrocarbons, Buccinum, Nuccula, Chlamys, Glasgow, *Firth Clyde(Scotland).

Surveys in the dumping grounds for sewage from the City of Glasgow show accumulations of PCBs in superficial sediments, suggesting that significant quantities of these chlorinated hydrocarbons have been dumped for about 20 years with a marked increase about 10 years ago. The benthic fauna in the area is correspondingly contaminated. With restrictions on the manufacture of PCBs and the elimination of other sources in the catchment area, levels of contamination are expected to drop. (Katz)
W76-11589

FLUORIDE IN MARINE ANIMALS,
Newcastle-upon-Tyne Univ. (England). Dept. of Plant Biology.
For primary bibliographic entry see Field 5C.
W76-11593

WATER QUALITY MANAGEMENT PLANNING FOR URBAN RUNOFF.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5D.
W76-11600

MERCURY IN LAUNDRY WASTEWATERS,
Illinois Inst. for Environmental Quality, Chicago.
For primary bibliographic entry see Field 5D.
W76-11602

MODELING SOLUTE TRANSPORT IN GROUND WATER,
Geological Survey, Denver, Colo.
L. F. Konikow.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 20-3-1 - 20-3-6. 7 fig, 18 ref.

Descriptors: *Model studies, *Groundwater, *Path of pollutants, *Solutes, *Industrial wastes, Flow, Ponds, Aquifers, Chlorides, Computer programs.
Identifiers: *Solute transport, Disposal ponds.

A computer model for simulating solute transport in flowing groundwater was developed by coupling a finite-difference solution to a groundwater flow equation with the solution to a solute-transport equation using the method of characteristics. The model accurately reproduced the observed 30-year history of contamination at the Rocky Mountain Arsenal in Colorado where liquid industrial wastes seeped out of unlined disposal ponds and spread for many square miles in an underlying alluvial aquifer. The model also integrated the effects of several factors that controlled changes in chloride concentrations. The model can thus predict the rates and directions of the spreading of conservative contaminants from known or projected sources when adequate hydrogeologic data are available. (See also W76-10637) (Kreager-FIRL)
W76-11605

AN IMPROVED MODEL FOR ANALYSIS OF AIR AND WATER POLLUTION DATA,
Environmental Protection Agency, Las Vegas, Nev. Office of Research and Development.
D. T. Mage, and W. R. Ott.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 20-5-1 - 20-5-5. 5 fig, 2 tab, 13 ref.

Descriptors: *Model studies, *Water pollution, *Statistical models, *Mathematical models, *Diffusion, Ohio river, Rivers, Biochemical oxygen demand, Chemical oxygen demand, Coliforms, Chlorides, Sulfates, Analytical techniques.
Identifiers: Data analysis.

The role of univariate probability models in environmental data analysis is discussed, and an improved model for the analysis of air and water pollution data is presented. The improved model is based on a 3-parameter lognormal distribution and is proposed by considering diffusion processes, including sources and sinks, as stochastic phenomena. When the third parameter is negative, the model is censored at the third parameter; and when the third parameter is zero, a standard 2-parameter lognormal model results. The model was examined for 9 sets of water quality data obtained from the Ohio River including biochemical oxygen demand, chemical oxygen demand, coliforms, chloride, and sulfate. It showed considerable improvement over a standard 2-parameter lognormal distribution when parameters were estimated by the method of maximum likelihood. The model is recommended for general purpose analyses of environmental data. (See also W76-10637) (Kreager-FIRL)
W76-11606

FINE PARTICLES AND WATER QUALITY IN THE COASTAL MARINE ENVIRONMENT,
State Univ. of New York at Stony Brook. Marine Sciences Research Center.
J. R. Schubel.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 34-2-1 - 34-2-11. 5 fig, 3 tab, 48 ref.

Descriptors: *Suspended solids, *Estuaries, *Organic compounds, *Water pollution effects, *Coasts, Aquatic life, Dissolved oxygen, Nutrients, Geology.

The effect of man's activities on the particulate matter loading and water quality of coastal marine environments is discussed. Inputs of naturally-occurring particulate matter to the coastal environment are being increased by land-use practices, dam and reservoir construction, river diversion, and projects to control shore erosion. Anthropogenic particulate matter input is also increasing as well as the local production of organic material as a result of nutrient loading. The increased influxes of particulate matter are significantly reducing the geological lifetimes of many coastal embayments, particularly estuaries. High concentrations of fine-grained suspended matter are degrading some coastal systems to the extent that their useful biological and recreational lifetimes may be cut drastically shorter than their geological lifetimes. Suspended particulate matter is capable of affecting the distribution of dissolved oxygen, decreasing the production of oxygen by rooted aquatic plants, acting as both a source and sink for nutrients, and concentrating various water pollutants. Representative concentrations of total suspended matter are tabulated for various estuarine environments. (See also W76-10637) (Kreager-FIRL)
W76-11612

5C. Effects Of Pollution

THE MICROBIAL DEGRADATION OF OIL IN THE SEA,
University Coll., Cardiff (Wales). Dept. of Microbiology.
For primary bibliographic entry see Field 5B.
W76-11101

UTILIZATION OF STREAM-BORNE PHOSPHORUS BY CAYUGA LAKE PHYTOPLANKTON,
Cornell Univ., Ithaca, N. Y.
J. P. Barlow.
Available from the National Technical Information Service, Springfield, Va., 22161, as PB-256 209, $3.50 in paper copy, $3.00 in microfiche. Completion Report, July 1976, 18 p, 5 fig., 1 tab., 9 ref. OWRT A-064-NY(1). 14-34-0001-6033.

Descriptors: *Phosphorus, *Eutrophication, Nutrients, Algae, Lakes, *Phytoplankton, *New York, Water pollution effects, Seasonal, Streams, Absorption.
Identifiers: *Cayuga Lake(NY), Desorption.

The objective has been to determine seasonal and within season variations in both amounts and biological availability of phosphorus (P) discharged by Salmon Creek, one of the major tributaries to Cayuga Lake. The stream P was partitioned into soluble and particulate forms by filtration, and, in addition, P was desorbed from particles by mixing stream water with low P lake water. Availability of these assays shows that desorbable P was most readily utilized, followed closely by soluble P in stream water, but that very little of the particulate P was useable. There appear to be seasonal variations in relative availability, as well as variations within single runoff events. Although these results are still preliminary, it is clear that, since most of the stream P is associated with particles, the availability of this P must be taken into account when estimates of P loading are made.
W76-11108

IMPACT STATEMENT FOR THE AQUATIC PLANT-CONTROL PROGRAM-STATE OF TEXAS,
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 6G.
W76-11146

RELATIONSHIP BETWEEN WATER QUALITY AND PLANT GROWTH IN PONDS,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Soils and Crops.
D. N. Riemer, and H. L. Motto.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 513, $4.00 in paper copy, $3.00 in microfiche. New Jersey Water Resources Research Institute, New Brunswick, Completion Report, July 1976. 37 p, 15 fig, 11 tab, 1 ref. ONRT A-034-NJ(3) 14-31-0001-4030.

Descriptors: *Ponds, *Phytoplankton, *Water quality, *Carbon dioxide, *Nitrogen, *Phosphorus, Plants, Vegetation, Nutrients, Sediments, Anaerobic conditions, Oxygen, Eutrophication, Water pollution effects.

Phytoplankton growth, oxygen, nitrogen, phosphorus, carbon dioxide, and other parameters were measured in 12 ponds over a three year period. An unsuccessful attempt was made to increase the soluble phosphorus level of some of the ponds, apparently because the soluble phosphorus is an equilibrium value determined by conditions in the pond. Phytoplankton was generally at a maximum in late summer or early fall. Due to the occurrence of different vegetation types in different ponds, quantitative comparisons of growth among ponds could not be made. Maximum levels occurred during the winter and minimum levels occurred during the period of maximum phytoplankton growth. Soluble phosphorus was at a minimum during the winter and at a maximum during the summer. Carbon dioxide at the surface was depleted during periods of maximum phytoplankton growth but reached its maximum at the pond bottoms at the same time. The results indicate that nitrate, orthophosphate, and carbon dioxide levels fluctuate widely during the year and must be measured at specific times to obtain meaningful results. In the ponds studied, carbon dioxide production and release of phosphorus from insoluble forms appear to be the primary controlling factors in phytoplankton growth.
W76-11170

THE EFFECTS OF VARIATIONS IN TURBIDITY ON CYCLES OF PLANKTONIC AND BENTHIC ORGANISMS IN FLOOD CONTROL RESERVOIRS,
Mississippi Univ., Dept. of Biology.
Y. J. McGaha, J. W. Burris, and C. M. Cooper.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-256 555, $4.00 in paper copy, $3.00 in microfiche. Mississippi Water Resources Research Institute, Mississippi State, Completion Report, July 1976. 41 p, 12 tab, 28 ref, append. OWRT A-090-MISS(1).

Descriptors: *Turbidity, Biology, *Productivity, *Mississippi, *Plankton, Reservoirs, *Benthos, Flood control, Suspended solids, Water pollution effects, Cycles, Succession, *Grenada Reservoir(Miss).

The effects of turbidity on plankton and macrobenthos cycles in four northern Mississippi flood control reservoirs were studied. Turbidity measurements in part per million SiO2 were analyzed with other concomitant physiochemical data to ascertain the effects of suspended materials on planktonic and benthic cycles in the impoundments. A quantitative plankton analysis was made and 27 of the most abundant genera were entered in a computerized stepwise regression analysis against 20 predictor variables consisting of the physiochemical data. Significant correlation with respect to the turbidity variable was observed in 10 genera. A regression summary listing turbidity and other variables with significance above the .05 level is given for each of the 10 genera. Benthic organisms were analyzed separately and data were

not computerized. An analysis of community degradation of benthos as a result of environmental stress brought on by turbidity related phenomena was undertaken. The main emphasis of the benthos study was in Grenada Reservoir, Mississippi.
W76-11172

LONG-TERM ACIDIFICATION OF A LAKE AND RESULTING EFFECTS ON FISHES,
Fisheries and Marine Service, Nanaimo (British Columbia). Biological Station.
R. J. Beamish, W. L. Lockart, J. C. van Loon, and H. H. Harvey.
Ambio, Vol. 4, No. 2, p. 98-102, 1975. 2 fig., 2 tab., 24 ref.

Descriptors: *Hydrogen ion concentration, *Reproduction, *Biomass, *Fish diseases, Pathology, *Lake trout, *Burbot, *Suckers, Lakes, *Calcium, Environmental effects, Water quality, *Spawning, *Metabolism, *Productivity, Fish populations, Size, Growth rates, On-site investigations, Pikes, *Acidic water, Acidity, Water pollution, Oligotrophy, Dominant organisms.
Identifiers: Sublethal effects, *George Lake(Canada).

Coincident with an annual decrease in pH of George Lake, at a rate of approximately 0.13 pH units per year, lake trout walleye, burbot, and small-mouth bass have disappeared. In 1973 northern pike, rock bass, pumpkin-seed sunfish, brown bullhead and white suckers did not reproduce successfully. The size and population of white suckers have decreased from 1967 to 1973 with a biomass in 1973 10 percent of that measured in 1968. Spinal deformities first appeared in the white sucker population in 1971 and increased to 32 percent by the fall of 1972. This appears to be related to a decrease in pH below 5.0. Abnormal concentrations of calcium in the serum of white suckers during the period of ovarian maturation was probably induced by low pH values and may be related to the failure of fishes to spawn. (Katz)
W76-11178

SEASONAL MORTALITY OF RAINBOW TROUT (SALMO GAIRDNERI) PLANTED IN SMALLL EUTROPHIC LAKES OF CENTRAL CANADA,
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
G. B. Ayles, J. G. I. Lark, J. Barica, and H. Kling.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 4, pt. 1, p. 647-655, April, 1976. 5 fig., 1 tab., 25 ref.

Descriptors: *Rainbow trout, *Fishkill, *Dissolved oxygen, *Mortality, *Seasonal, Aquiculture, *Eutrophication, *Temperature, Predation, *Mortality, Commercial fish, *Fish farming, *Productivity, Environmental effects, Trout, Salmonids, Lakes, Ammonia, Bioassay, Laboratory tests, Cyanophyta, Hydrogen ion concentration, water pollution effects.
Identifiers: Sublethal effects.

The seasonal mortality pattern and the causes of the mortality of planted rainbow trout (Salmo gairdneri) were studied in eight small eutrophic lakes in central Canada used for extensive aquaculture. Two periods of mortality were reveald. The first occurred in all lakes during the first 60 days of residence in the lakes and resulted in the mortality of 60-90% of the numbers of fish stocked. The second period occurred in about 20% of the lakes and was due to low oxygen levels following the collapse of a bloom of Aphanizomenon flos-aquae. Rainbow trout are close to their physiological upper tolerance levels in these lakes. Other possible causes of mortality were synergistic effects between algal toxins, ammonia and temperature and bird predation. (Katz)
W76-11179

THERMAL TOLERANCE OF STORED FUNDULUS HETEROCLITUS GAMETES: FERTILIZABILITY AND SURVIVAL OF EMBRYOS,
Texas A and M Univ., College Station. Dept. of Biology.
K. P. Kuchnow, and R. S. Foster, IV.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 676-680, 1976. 2 fig., 3 tab., 22 ref.

Descriptors: Reproduction, Laboratory tests, *Temperature, *Mortality, *Fish reproduction, *Fish eggs, *Embryonic growth stage, Breeding, Fish, Teleosts, Aquiculture, Fish management, *Thermal stress, *Thermal pollution, Fertilization, *Gametocides, Water pollution effects.
Identifiers: Gametes, *Fundulus heteroclitus.

Fundulus heteroclitus ova were tested for fertility after storage intervals between 6 and 96 hr over a temperature range of 0-30 C. Sperm were tested after storage intervals of 2 to 24 hr over a temperature range of 0-20 C. Ova retained fertility best at 10-14 C with fertilization rates of 93, 80, and 46% after 24, 48 and 72 hr, respectively. Sperm retained fertility best at 0-4 C, with fertilization rate of 85, 59, and 25% after 2, 4, and 6 hr, respectively. Sperm retained fertility for a shorter time than ova because of sperm activity initiated by stripping. Variation in mortality in stored ova could be attributed to temperature differences. No relation between sperm storage temperatures and embryo mortality was found. (Katz)
W76-11180

PETROLEUM COMPOUNDS IN THE MARINE FOOD WEB: SHORT-TERM EXPERIMENTS ON THE FATE OF NAPHTHALENE IN CALANUS,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
E. D. S. Corner, R. P. Harris, C. C. Kilvington, and S. C. M. O'Hara.
Journal of the Marine Biological Association of the United Kingdom, Vol. 56, p. 121-133, 1976. 3 fig., 5 tab., 18 ref.

Descriptors: *Organic compounds, *Bioassay, *Absorption, *Path of pollutants, *Food webs, *Food chains, *Tracers, *Zooplankton, *Oil wastes, Metabolism, Methodology, Radioactivity, Laboratory tests, Crustaceans.
Identifiers: Naphthalene, Depuration, *Calanus sp., Bioaccumulation.

Adult female Calanus helgolandicus immersed for 24 hours in sea-water solutions of radioactively marked naphthalene accumulated a detectable quantity (3.6 pg/animal) from concentrations as low as 0.10 micrograms/1. Feeding experiments showed that the dietary route of entry was more important quantitatively than direct uptake from solution in that in order to ensure that the same quantity of radioactivity in the animals was attained by the two routes the level of hydrocarbon in solution had to be far greater than that present in particulate food. Depuration was much more rapid in organisms accumulating naphthalene from solution in sea water as compared to uptake through food sources. Only 5% of the original radioactivity remained after 10 days in the former case and about one third of the original radioactivity was detected after 10 days in the latter group. Short-term experiments determined that Calanus was able to metabolize naphthalene. (Katz)
W76-11181

UPTAKE PATHWAYS AND ELIMINATION OF A NONIONIC SURFACTANT IN COD (GADUS MORRHUA L.),
Kristinbergs Zoologiska Station (Sweden).
A. Granmo, and S. Kollberg.
Water Research, Vol. 10, p. 189-194, 1976. 4 fig., 2 tab., 23 ref.

Descriptors: *Absorption, *Surfactants, *Adsorption, *Mode of action, *Toxicity, *Temperature, *Oxygen, Laboratory tests, Water pollution effects, Methodology, Seasonal.
Identifiers: Gadus morhua, Tissue analysis, *Cod, Elimination, Bioaccumulation, Gills, Sub-lethal effects, Honylphonol cthoxylate.

The uptake and elimination of a labelled surfactant, the nonionic nonylphenol ethoxylate, was studied in cod (Gadus morrhua) exposed to a concentration of 5 ppm. The amount of labelled surfactant was analyzed by the scintillation counting method in various tissues from the fish. A penetration through the gills, and some intestinal resorption was found. Eight hours from start a steady state condition was obtained. High concentrations were found especially in gall bladder and liver. The elimination process in clean sea water was rapid and was evident after 24 hr. (Katz)
W76-11182

AN ASSESSMENT OF THE BASIS OF MERCURY TOLERANCE IN DUNALIELLA TERTIOLECTA,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
A. G. Davies.
Journal of the Marine Biological Association of the United Kingdom Vol. 56, p. 39-57, 1976. 6 fig., 3 tab., 38 ref.

Descriptors: *Toxicity, *Growth rates, *Bioassay, *Cytological studies, *Morphology, *Phytoplankton, Resistance, Laboratory tests, Heavy metals, Path of pollutants, Toxicants, Biochemistry, Metabolism, Amino acids, Potassium, *Mercury.
Identifiers: *Dunaliella sp., *Detoxication.

The specific growth rate of Dunaliella tertiolecta was unaffected by mercury II concentrations of at least 2.03 micrograms at/1 and a final level of cell material 13% below that of the control was obtained after exposure to 10 micrograms at/1. Growth was largely uncoupled from division and giant cells were produced, probably due to the effect of mercury upon the production of methionine which is associated with the process of cell division. Mercury tolerance was investigated in terms of (1) mercury detoxication in the culture medium by complex or compound formation between the metal and cellular metabolites, (2) the concentration of sulphydryl groups within the cell as sequestration sites, (3) the absence of cellular potassium leakage and (4) the resistance of the cell membrane to the uptake of mercury II ions. Results indicated that the mercury tolerance of D. tertiolecta is partly related to the slow rate of mercury accumulation by this species, but is largely due to the detoxification of the mercury within the cell, possibly by the precipitation of a highly insoluble mercury compound. (Katz)
W76-11183

CADMIUM UPTAKE BY MARINE FISH LARVAE,
Bundesforschungsanstalt fuer Fischerei, Hamburg (West Germany). Institut fuer Kuesten- und Binnenfischerei.
V. Dethlefsen, H. von Westernhagen, and A. Rosenthal.
Helgolander wissenschaftliche Meeresuntersuchungen, Vol. 27, p. 396-407, 1975. 6 fig., 30 ref.

Descriptors: *Larval growth stage, *Absorption, *Herrings, Marine fish, *Cadmium, Path of pollutants, *Metals, *Fish eggs, *Bioassay, Public Health, Laboratory tests, Fish, Heavy metals, Pathology, Analytical techniques, Spectrophotometry, Toxicants, Water pollution effects, Pollutant identification.
Identifiers: Bioaccumulation, *Platichthys sp., *Belone sp., *Flounder, Sublethal effects.

Eggs of herring (Clupea harengus), flounder (Platichthys flesus) and garpike (Belone belone) were incubated in cadmium contaminated water (0.05-5.0 ppm) and newly hatched larvae were analysed for cadmium contents. Cadmium residues in newly hatched larvae were dependent on cadmium concentrations during incubation. Newly hatched flounder and herring larvae contained two orders of magnitude more cadmium than Belone belone larvae (0.7-2.3 nannograms Cd/0.1 mg dry weight and 0.0017-0.0185 nannograms Cd/0.1 mg dry weight respectively). Cadmium content of herring and flounder larvae held in cadmium contaminated water increased with exposure time. Herring larvae accumulated more cadmium than flounder larvae held in the same conditions. (Katz)
W76-11184

THE BALTIC SEA POLLUTION,
Morski Instytut Rybacki, Gdynia (Poland).
L. Zmudzinski.
Polskie Archiwum Hydrobiologii, Vol. 22, No. 4, p. 601-614, 1975. 6 fig., 9 tab., 17 ref.

Descriptors: *Organic compounds, Water pollution effects, *Eutrophication, *Bioindicators, *Biodegradation, *Nutrients, *Primary productivity, On-site data collections, Water quality, *Phytoplankton, Benthos, *Biomass, Commercial fish, *Pesticide residues, Crustaceans, Invertebrates, Sediments, Phosphates, Reproduction, Water pollution sources, Environmental effects, Degradation(Decomposition), DDT, Oil pollution.
Identifiers: *Baltic Sea, *Flavobacterium.

Between 1971-1973 complex studies on the Baltic Sea pollution were carried out giving special attention to the problems of eutrophication and contamination with hydrocarbons. Eutrophication has been observed in the Baltic Sea during the last 40 years as evidence by an increase in the concentration of nutrients in the sea water, and by a growing number of invertebrates and a higher yield of fish. A total area of 60-80 thousand square km has been devastated by eutrophication in the Baltic Sea. Some species of crustaceans are the most sensitive bioindicators of hydrocarbons in the water of the Baltic Sea while benthic fishes belong to the least sensitive organisms. In the biodegradation of hydrocarbons bacteria of the Flavobacterium genus show the highest activity. Their activity decreases with a decrease in temperature and an increase in the hydrocarbons concentration in the Baltic Sea waters. (Katz)
W76-11185

EFFECTS OF BISULFITE ON METABOLIC DEVELOPMENT IN SYNCHRONOUS CHLORELLA PYRENOIDOSA,
British Columbia Univ., Vancouver. Dept. of Plant Science.
G. Das, and V. C. Runeckles.
Environmental Research, Vol. 7, p. 353-362, 1974. 2 tab., 5 fig., 24 ref.

Descriptors: *Nutrients, Environmental effects, *Algae, Laboratory tests, *Growth rates, Sulfates, *Primary productivity, *Plant growth, *Sulfur compounds, *Toxicity, *Metabolism, Plant physiology, Photosynthesis, Productivity, Plant pathology, Inhibitors, Copper, Magnesium, Sodium, Calcium, Potassium.
Identifiers: *Chlorella pyrenoidosa, *DNA, *Sulfites, *Bisulfite, RNA.

Addition of bisulfite to synchronous cultures of Chlorella pyrenoidosa adversely affects both active growth and cell propagation. Biochemical analysis after treatment showed a differential change in the levels of chlorophylls, protein, RNA and DNA, when expressed as percentages of the cell dry weight: the content of chlorophyll 'b' increased, whereas that of chlorophyll 'a' decreased gradually with increases in HSO3-. The amounts of protein and RNA per unit dry weight remained constant, but DNA levels were markedly reduced. With the exception of iron, the levels of nutrient elements within the cells increased with increasing HSO3- concentration. The relative increases were most marked with K, Mg, Ca, Cu and Na. This suggests that HSO3- adversely affects cell development by impairing DNA synthesis. (Katz)
W76-11187

THE TOXICITY OF THE HERBICIDE DICHLOBENIL TO GOLDFISH (CARASSIUS AURATUS),
Utrecht Rijksuniversiteit (Netherlands). Inst. of Veterinary Pharmacology and Biological Toxicology.
G. Bolier, H. L. Van Der Maas, and R. Bootsma.
Meded Fac Landbouwwet Rijksuniv Gent. 38(3); p 733-740, 1973.

Descriptors: *Toxicity, Water pollution effects, Pesticide residues, Herbicides, Lethal limit, Pollutant identification.
Identifiers: Carassius-Auratus, *Dichlobenil, *Goldfish.

Goldfish were treated for 3 mo. with the herbicide at different dose levels and residues were determined. None of the fish died during the test. Body weight was decreased and the behavior of the animals was abnormal only at the highest concentration (6.4 mg/l) tested. Swimming was with jerky movements and respiration was quick and irregular. This group also had a higher number of granulocytes and less lymphocytes than fish tested at lower pesticide concentrations. No liver lesions were observed. The no toxic effect level for goldfish and continuous exposure during 3 mo. may be given as between 0.4 and 1.6 mg/l in water. The corresponding no toxic effect residue in the whole fish is between 8 and 29 ppm. For use as an herbicide in water, dichlorobenil should be applied at an estimated concentration of 1 mg/l. This recommended dosage does not appear to be a risk to fish life, but it should be noted that reproductive aspects were not covered in this study.--Copyright 1974, Biological Abstracts, Inc.
W76-11188

EFFECTS, UPTAKE AND METABOLISM OF METHOXYCHLOR, MIREX, AND 2,4-D IN SEAWEEDS,
Syracuse Univ., Research Corp., N. Y.
H. C. Sikka, G. L. Butler, and C. P. Rice.
Environmental Protection Agency, Report EPA-600/3-76-048, June 1976. 40 p., 12 tab., 41 ref.

Descriptors: *Pesticides, *Insecticides, *Chlorinated hydrocarbon pesticides, Aquatic plants, *Algae, *Herbicides, *2,4-D, Marine algae, Physiology(Plant), Biochemistry, Laboratory procedures, Carbohydrates, Environmental effects, Degradation(Decomposition), Metabolism, Photosynthesis, Proteins, Laboratory analysis, Lipids, Chlorophyll, Carbon radioisotopes.
Identifiers: *Methoxychlor, *Mirex, Ulva, Enteromorpha, Rhodymenia, Trace metals, Metabolism.

Results are presented of a study concerning effects, uptake, and metabolism of mirex, methoxychlor, and 2,4-D in the seaweeds Ulva sp., Enteromorpha sp., and Rhodymenia sp. None of the pesticides, at concentrations corresponding to their maximum solubility in seawater, had any significant effect on photosynthesis, protein, carbohydrate, lipid, chlorophyll, carotenoid or trace metal content of the algae. All three algae removed substantial amounts of mirex and methoxychlor from the medium, but uptake of 2,4-D was extremely low. The rate of uptake of methoxychlor was considerably greater than that of mirex. Enteromorpha accumulated considerably more mirex and methoxychlor than Ulva or Rhodymenia. Both Ulva and Enteromorpha failed to metabolize either mirex or 2,4-D. Enteromorpha metabolized methoxychlor to a limited extent. After 7 days of incubation with carbon-labelled methoxychlor, a major portion of the label in the tissue and medium was present in unchanged methoxychlor. A small amount of radioactive metabolite, 2,2-bis (p-methoxyphenyl)-1,1-dichloroethylene, was detected in both the tissue and medium. In addition, medium contained 2,2-bis (p-hydroxyphenyl)-1,1,1, 1-trichloroethane and four unidentified minor radioactive metabolites. Unlike Enteromorpha, Ulva did not metabolize methoxychlor. (Katz)
W76-11189

EFFECTS OF SULFUR DIOXIDE AND/OR OZONE ON SEVERAL OAT VARIETIES, 1975 ANNUAL REPORT,
North Carolina State Univ., Raleigh.
W. W. Heck, and J. A. Dunning.
Environmental Protection Agency, Report EPA-600/3-76-032, March, 1976, 73 p., 64 tab., 5 ref.

Descriptors: *Sulfur compounds, Air-water interfaces, *Environmental effects, *Toxicity, *Oats, *Cereal crops, Oxygen, Physiology(Plant), Mortality, Field crops, Statistical analysis, Methodology, Growth rates, *Ozone, Plant growth, Grains(Crop).
Identifiers: *Sulfur dioxide.

Nine experimental designs were run to determine the effect of sulfur dioxide on the important Southeastern oat variety - Carolee. The designs were run under controlled conditions and looked at sulfur dioxide concentration (25-300 pphm), ozone interactions, growth and exposure temperatures, growth and exposure humidities, growth and exposure light intensities, nutrient sulfur levels, number of exposures and exposure ages, and a screen for growth conditions. Plants were grown to from 28 days to 84 days before final harvest. Top dry wt, root dry wt, number of tillers and injury were determined for all experimental designs except No. 5 and No. 8. The fifth design also included yield measurements and the eighth did not include the biomass data. The 75 pphm treatments for 1.5 hrs were close to a threshold dose. Growth environmental factors affected the response of the plants and in some cases exposure conditions caused an effect. Sulfur nutrition was a signification factor and showed an interaction with SO2 concentration on several response measures. Foliar injury was highly correlated with growth reductions. Several designs studied the effects of ozone alone (No. 6, 7, 8) or in combination with sulfur dioxide (No. 13). Two designs utilized 2 additional oat varieties, Salem and Coker 227 (No. 8, 9). (Katz)
W76-11190

TEMPERATURE, INFECTIOUS DISEASES, AND THE IMMUNE RESPONSE IN SALMONID FISH,
Oregon State Univ., Corvallis. Dept. of Microbiology.
J. L. Fryer, K. S. Pilcher, J. E. Sanders, J. S. Rohover,, and J. L. Zinn.
Environmental Protection Agency, Report EPA 600/3-76-021, April, 1976, 72 p., 16 tab., 8 fig., 9 ref.

Descriptors: Freshwater fish, *Salmon, +Mortality, *Water pollution effects, *Trout, Commercial fish, Temperature, *Water temperature, Heated water, Environmental effects, *Thermal stress, Laboratory animals, Animal diseases, Epizootiology, Rainbow trout, *Fish diseases, *Thermal pollution.
Identifiers: *Infectious diseases(Fish), Immune responses, Steelhead trout, Aeromonas salmonicida, Aeromonas liquefaciens, Mortality rates, Antibodies.

Investigations of the effect of temperature on infections of salmonid fish were conducted. Aeromonas salmonicida infection was studied in chinook salmon and steelhead trout; Aeromonas

liquefaciens infection was studied in chinook and coho salmon. In all cases mortality rates were high at 64 to 69 F; usually moderate at 54 to 59 F; and low or zero at 39 to 49F. Progress of the infections was accelerated at higher temperatures and retarded at lower temperatures. Bacterial kidney disease was studied in coho salmon and steelhead trout. The temperature range of 44 to 54F was optimal for the development of fatal infection as indicated by mortality rates of 78 to 100%. Higher temperatures had a suppressing effect, which was marked at 69F. Temperatures of 59 to 69F were optimal for the formation of agglutinating antibody when juvenile coho salmon were injected with a killed suspension of A. salmonicida. At lower temperatures less antibody was formed and no significant amount was produced at 39F 60 days after injection of antigen. Oral immunization of juvenile coho salmon with a vaccine consisting of formalin killed Vibrio anguillarum cells incorporated in their diet protected them against fatal infection when the fish were held at temperatures ffom 39 to 69F during immunization. (Katz)
W76-11191

HERBICIDE TOXICITY IN MANGROVES,
Miami Univ., Coral Gables, Fla.
H. J. Teas.
Environmental Protection Agency, Report EPA-600/3-76-004, March, 1976, 34 p., 13 tab., 1 fig., 32 ref.

Descriptors: *Herbicides, *2,4-D, *Mangrove swamps, *Radioisotopes, *Toxicity, Mortality, *Bioassay, *Florida, Chlorine radioisotopes, Carbon radioisotopes, Plant growth, Metabolism, Coastal marshes, Plant physiology, *Pesticide toxicity, *Lethal limit.
Identifiers: *Picloram, *Mangroves, Red mangrove, Rhizophora mangle, White mangrove, Laguncularia racemosa, Black mangrove, Avicennia germinans, Radiochloride, Tolerance doses.

The amine salts of 2,4-D and picloram were applied to the Florida species of mangroves: red mangrove (Rhizophora mangle), white mangrove (Laguncularia racemosa) and black mangrove (Avicennia germinans). Treatments were to soil or water by aerial spray and to single leaves as droplets. The effects on radiochloride uptake and on localization of radio-carbon-labelled picloram after leaf application were studied in red mangrove. 'Lethal doses' for young seedlings were 2.7 kg/ha for white mangrove, 13 kg/ha for red and 13 kg/ha for black; for mature plants they were 2.7, 13 and > 53 kg/ha, respectively. 'Tolerance doses' for young seedlings were 0.01, 5.3, and 5.3 kg/ha; for mature plants they were 0.5, 5.3 and 53 kg/ha. 'No effect doses' for seedlings were < 0.01 kg/ha for all spcies; for mature plants they were < 0.1, 0.5 and 2.7 kg/ha. Spray applications of 6.3 - 12.2 kg/ha of commercial mixture to the canopy of a mixed-species forest caused partial defoliation within three weeks. Within 16 months it killed all of the white, 78-100% of the mature red, but none of the mature black mangroves. Radiocarbon-labelled picloram concentrated in dormant buds of red mangrove and it is concluded that the tree is killed by the mixture because of its effects on them. (Katz)
W76-11192

ACUTE TOXICITY OF CERTAIN PESTICIDES TO ACARTIA TONSA DANA,
Hazleton Labs. America, Inc., Vienna, Va.
F. H. Khattat, and S. Farley.
Environmental Protection Agency, Report EPA 600/3-76-033, May, 1976, 29 p., 9 tab., 2 fig., 38 ref.

Descriptors: *Toxicity, *Bioassay, Laboratory methods, *Marine animals, Pesticides, *Organophosphorous pesticides, *Chlorinated hydrocarbon pesticides, Crustaceans, *Diazonin, Methodology, Marine algae, *Pesticide toxicity, *Copepods, Water pollution effects, Reviews.
Identifiers: Calanoid copepods, *Acartia tonsa, Residue analysis, *Methylparathion, *Azodrin, *Toxaphene, Acute toxicity, LC-50.

The acute toxicity to the marine copepod Acartia tonsa Dana of four technical grade insecticides was determined by bioassay using standardized procedures, homogeneous populations and constant laboratory conditions. At a water temperature of 17 + or - 1 deg. C, the 96-hour median lethal concentrations or tolerance limits for methy parathion, Azodrin, diazinon and toxaphene were computed as 0.89 milligrams per liter, 0.24 milligrams per liter, 2.57 micrograms per liter and 7.2 nanograms per liter, respectively. Residue analysis of diazinon at zero and 96-hour exposure time revealed that the mounts of diazinon uptake by three algal organisms are greater than amounts concentrated by the copepod. The toxicity of higher concentrations above 2.0 ppm (2 milligrams per liter) has offset copepod uptake, while at lower concentrations, quantities concentrated by Acartia are negligible. (Katz)
W76-11193

TEMPERATURE EFFECTS OF YOUNG YELLOW PERCH, PERCA FLAVESCENS (MITCHILL),
Environmental Research Lab., Duluth, Minn.
J. H. Mc Cormick.
Environmental Protection Agency, Report EPA-600/3-76-057, May, 1976, 19 p, 2 fig., 31 ref., 1 tab.

Descriptors: *Freshwater fish, *Yellow perch, *Commercial fish, *Juvenile fish, *Mortality, Water pollution effects, Temperature, *Water temperature, Heated water, Environmental effects, *Thermal stress, Growth, Bioassay, Laboratory animals, *Thermal pollution, Juvenile growth stages, Growth rates.

The effect of temperature on growth of young-of-the-year perch was determined over an 8-week period at constant temperatures from 8 deg. to 34 deg C. Absolute growth rate peaked at 28 deg C, but were not significantly less ($P > 0.5$) over the range from 26 deg. to 30 deg. C. Deformities occurred at 32 deg. C but at no lower temperatures, and all fish died within 7 days at 34 deg. C. A suggested seasonal temperature cycle for yellow perch habitats is presented, based on the data from this experiment for the summer period of rapid growth and on data from previous studies for other life stages. (Katz)
W76-11194

STUDIES ON THE SUSCEPTIBILITY OF ANKISTRODESMUS SPECIES TO CRUDE OIL COMPONENTS,
P. B. Kauss, and T. C. Hutchinson.
Verhandlungen International Vereinigung Limnologie, Vol. 19, p. 2155-2164, November, 1975. 8 fig., 1 tab., 15 ref.

Descriptors: *Aqueous solutions, *Productivity, *Inhibitors, *Bioassay, *Algae, *Growth rates, Oil, *Oil spills, *Plant growth, Laboratory tests, Methodology, Primary productivity, Separation techniques, Water pollution sources, Water pollution effects, Environmental effects.
Identifiers: *Ankistrodesmus sp.

Eight species and varieties of Ankistrodesmus, a green alga, were exposed to water soluble crude oil extract to determine variations in the effect of crude oil on algae. The water soluble compounds caused responses varying from growth stimulation to growth inhibition within and among the species. Cells of A. amalloides, A. braunii, A. falcatus var. acicularis, A. nanoselene and A. falcatus var. duplex exhibited a lag phase of 1 to 2 days when exposed to the oil extract. After this period, normal growth resumed. Reduced growth rate was observed in A. nanoselene from day 2 to 10. A. falcatus var. duplex showed a greater rate of growth after the initial lag. Extrapolation of laboratory bioassay data to predict the effects of an actual field spill is difficult due to the effects of evaporation, biodegradation and effects of nonsoluble portions. (Katz)
W76-11195

PROCEEDINGS, SEVENTEENTH CONFERENCE ON GREAT LAKES RESEARCH, PART 1.
For primary bibliographic entry see Field 2H.
W76-11275

THE CRUSTACEAN ZOOPLANKTON OF GREEN BAY, LAKE MICHIGAN,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
For primary bibliographic entry see Field 2H.
W76-11278

DIELDRIN AND DDT: ACCUMULATION FROM WATER AND FOOD BY LAKE TROUT (SALVELINUS NAMAYCUSH) IN THE LABORATORY,
Bureau of Commercial Fisheries, Ann Arbor, Mich. Great Lakes Fishery Lab.
R. E. Reinert, L. J. Stone, and H. L. Bergman.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 52-58, 1974. 2 tab, 4 ref.

Descriptors: *Dieldrin, *DDT, *Lake trout, *Lake Michigan, Insecticides, Pesticides, Pollutants, Fish, Trout, Laboratory tests, Biology, Path of pollutants, Water pollution, Chlorinated hydrocarbon pesticides, Organic pesticides, Halogenated pesticides.
Identifiers: *Accumulation of insecticides.

In the laboratory the amounts of dieldrin and p,p'DDT accumulated by fish from contaminated water and food were measured to determine how fish from Lake Michigan accumulate high concentrations of these insecticides from an environment where the concentrations in water are generally less than 0.01 ppb. Eight groups of yearling lake trout (Salvelinus namaycush) were exposed to different combinations of dieldrin and p,p'DDT in water and food. Concentrations of dieldrin and p,p'DDT ranged from 0.006 to 0.010 ppb in water and from 1,700 to 2,300 ppb in food (Oregon moist pellets). After 152 days of exposure to insecticides in water, fish had accumulated an average of 478 ppb dieldrin or 352 ppb p,p'DDT. Fish exposed to dieldrin and p,p'DDT in food accumulated 470 and 648 ppb, respectively. However, it was difficult to determine exactly how much of either insecticide was accumulated from the food because trace amounts (0.003-0.004 ppb) had leached from food or feces. After exposure to the insecticide was terminated, fish eliminated dieldrin at a much faster rate than p,p'DDT. In fish exposed to a combination of dieldrin and p,p'DDT in water and then held for 125 days in uncontaminated water, the total amount of dieldrin declined 89%, but the total amount of p,p'DDT remained unchanged. Data from this study were used to estimate how much p,p'DDT adult Lake Michigan coho salmon (Oncorhynchus kisutch) accumulated from water and from food during a 104-day period (May-August 1968). The estimates suggested that during these months coho salmon accumulated most of the body burden of p,p'DDT from food. (See also W76-11275) (Sims-ISWS)
W76-11279

LABORATORY ESTIMATES OF THE SEASONAL FINAL TEMPERATURE PREFERENDA OF SOME LAKE ERIE FISH,
Ohio State Univ., Put-in-Bay. Center for Lake Erie Area Research.
For primary bibliographic entry see Field 2H.
W76-11280

MIGRATORY BEHAVIOR OF FISH TAGGED AT A NUCLEAR POWER PLANT DISCHARGE INTO LAKE MICHIGAN,
Argonne National Lab., Ill. Radiological and Environmental Research Div.
For primary bibliographic entry see Field 2H.
W76-11281

STORM INDUCED RELATIONSHIPS AMONG CHEMICAL CONDITIONS AND PHYTOPLANKTON IN SAGINAW BAY AND WESTERN LAKE HURON,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
C. L. Schelske, L. E. Feldt, M. A. Simmons, and E. F. Stoermer.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 78-91, 1974. 5 fig, 6 tab, 7 ref. ERDA C00-2003-23, NSF GA-4507.

Descriptors: *Phytoplankton, *Chemical, *Nutrients, *Lake Huron, * Storms, Sampling, Surveys, Temperature, Hydrogen ion concentration, Chlorides, Turbidity, Chlorophyll, Nitrates, Phosphorus, Silica, Water pollution, Correlation analysis, Chemistry, Biology.
Identifiers: *Saginaw Bay(Mich).

More than 50 stations were sampled in September 1972 to assess environmental conditions in western Lake Huron. Nine transects were sampled, including three south of Saginaw Bay, three north of Saginaw Bay, two in Saginaw Bay and one in the Straits of Mackinac. Chemical and biological characteristics of the stations in Saginaw Bay were markedly different than the other stations sampled: total phosphorus, silica, chloride, chlorophyll a and rates of carbon fixation were larger while nitrate was smaller. Although changes were small, silica, nitrate nitrogen increased and chloride decreased from north to south at the open lake stations. Phytoplankton standing crop were larger in Saginaw Bay than at open-lake stations and tended to decrease with distance from shore on the transects. Average cell counts (4000 cells/ml) in Saginaw Bay were an order of magnitude larger than at the open lake stations. In Saginaw Bay, Anabaena subcylindrica Borge was the dominant form with smaller numbers of Fragilaria capucina Desm. and Melosira granulata (Ehr.) Ralfs. None of these species was dominant at other locations except at a few nearshore stations and at stations near Saginaw Bay. North of Saginaw Bay the phytoplankton assemblage was dominated by eight species of diatoms and small numbers of unidentified flagellates. The abundance of A. subcylindrica populations at stations in and adjacent to Saginaw Bay was related to chloride centration. Silica and chlorophyll a concentrations also behaved as conservative elements at these stations. These data suggest that short-term mixing of Saginaw Bay and open-lake water resulted from strong winds that preceded the sampling. (See also W76-11275) (Sims - ISWS)
W76-11282

CHANGES IN PHYTOPLANKTON FOLLOWING NITRATE PHOSPHATE ADDITIONS TO LARGE ENCLOSURES IN MARION LAKE, BRITISH COLUMBIA,
Ottawa Univ. (Ontario). Dept. of Biology.
M. Dickman.
Schweiz Z Hydrol. 35(1); p 114-120, 1973.

Descriptors: Phytoplankton, Canada, *Nitrate, *Phosphates, Lakes, Water pollution effects, Detergents, Primary productivity.
Identifiers: British-Columbia, *Nitrate phosphate, *Marion Lake (B.C.)

The addition of nitrate, phosphate and a nitrate phosphate combination to replicated wooden enclosures in Marion Lake (Canada) resulted in significant increases in primary productivity and algal standing crop in each of the 3 types of treated enclosures. No single nutrient is likely to simultaneously limit the growth of all phytoplankton species present at any one time in the lake epilimnion. The relevance of this to the detergent controversy is discussed.--Copyright 1974, Biological Abstracts, Inc.
W76-11283

MODELING OF PHYTOPLANKTON IN LAKE ONTARIO,
Manhattan Coll., Bronx, N. Y. Environmental Engineering and Science.
R. V. Thomann, R. P. Winfield, and D. M. DiToro.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 135-149, 1974. 12 fig, 2 tab, 13 ref. EPA R800610

Descriptors: *Model studies, *Phytoplankton, *Lake Ontario, *Great Lakes, Mathematical models, Nutrients, Pollutants, Nitrogen, Phosphorus, Carbon, Water pollution, Temperature, Chlorophyll, Biomass, Eutrophication, Epilimnion, Hypolimnion, Biology, Limnology.
Identifiers: *International Field Year for the Great Lakes.

A mathematical model of phytoplankton dynamics in Lake Ontario was developed and compared to observed data. The model is a horizontally well mixed representation of the lake with induced vertical mixing and stratification generating the epilimnion and hypolimnion. A third layer is included to represent the sediment. Phytoplankton chlorophyll, herbivorous and carnivorous zooplankton carbon, three nitrogen forms and two phosphorus forms are the primary dependent variables. Non-linear kinetics and interactions are used throughout to represent such phenomena as nutrient uptake, predation, recycling, and excretion products. Under reasonable sets of model parameters as reported in the literature and used in previous applications of the theory, the model output compared favorably with observed data on the dependent variables. Spring growth and peak chlorophyll concentrations are related primarily to increasing light and temperature. The model indicated that growth ceases due to phosphorus limitation. Zooplankton grazing and subsequent recycling of nutrients due to excretion and plankton respiration result in a late summer increase in phytoplankton biomass. Both nitrogen and phosphorus are then limiting resulting in a broad fall peak in phytoplankton biomass. A decline then results from low temperature due to fall overturn. The model indicated a response time of from 8 to 16 yrs before a decrease in nutrient inputs will completely become effective. (See also W76-11275) (Sims - ISWS)
W76-11286

PLUTONIUM DISTRIBUTION IN LAKE MICHIGAN BIOTA,
Argonne National Lab., Ill. Radiological and Environmental Research Div.
For primary bibliographic entry see Field 2H.
W76-11287

ASSESSMENT OF THE EFFECTS OF WASTE HEAT INPUTS ON WATER BUDGETS OF THE GREAT LAKES,
Acres Consulting Services, Ltd., Niagara Falls (Ontario).
R. A. Fleming, F. C. Elder, and P. J. Denison.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 389-398, 1974. 3 fig, 4 tab, 14 ref.

Descriptors: *Heated water, *Thermal pollution, *Water loss, *Great Lakes, Powerplants, Nuclear powerplants, Thermal powerplants, Heat, Heat transfer, Evaporation, Water temperature, Cooling towers, Cooling water, Air temperature, Lakes, Limnology, Meteorology.
Identifiers: *International Field Year for the Great Lakes, Evaporative losses, Waste heat.

Monthly heat transfer coefficients were calculated for each of the Great Lakes, including Georgian Bay, by means of a steady-state model. Overlake meteorological data gathered during the International Field Year for the Great Lakes (IFYGL) provided information on lake modification of atmospheric parameters. Using updated predictions of the waste heat inputs to the Great Lakes in the year 2000 A. D. , evaporative losses due to once-through cooling were estimated at 1% of the mean flow down the St. Lawrence River. The use of wet cooling towers is expected to increase the losses by 20 to 40%. An estimated 17% of the evaporative losses from either system is expected to be recovered within the basin as precipitation. (See also W76-11275) (Sims - ISWS)
W76-11305

COMPOSITION OF THE OLIGOCHAETE FAUNA OF CENTRAL LAKE MICHIGAN,
California Univ., Santa Barbara. Dept. of Biological Sciences.
R. P. Howmiller.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 589-592, 1974. 1 fig, 1 tab, 9 ref.

Descriptors: *Oligochaetes, *Surveys, *Benthic fauna, *Lake Michigan, Worms, Tubificids, Aquatic life, Aquatic animals, Benthos, Sediments, Invertebrates, Annelids, Sludge worms, Water pollution, Pollutants, Sampling, Lakes, Limnology.
Identifiers: Lumbriculids, Enchytraeids.

An account was given of the composition of the oligochaete fauna of the central region of Lake Michigan based on examination of samples from 15 stations. The fauna consisted of Stylodrilus heringianus, Tubifex tubifex, Limnodrilus hoffmeisteri, Lumbricillus, and another enchytraeid which appears to belong to the Henlea-Enchytraeus group. Stylodrilus heringianus is, by far, the most common and abundant species, occurring at almost 90% ofthe worms examined. A station several miles off Grand Haven, Michigan, yielded a sample dominated by Limnodrilus hoffmeisteri. This may be a reflection of local organic enrichment by polluted tributary rivers. (See also W76-11275) (Sims - ISWS)
W76-11323

PHOSPHORUS CYCLING AND LUXURY PHOSPHORUS STORAGE BY ALGAE IN THE WATERS OF GREEN BAY,
Wisconsin Univ., Green Bay. Coll. of Environmental Sciences.
J. C. Norman, and P. E. Sager.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 694, $4.00 in paper copy, $3.00 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report WIS WRC, 76-04, July 1976. 39 p, 8 fig, 5 tab, 32 ref, 3 append. OWRT A-059-WIS(1) 14-31-0001-4050 14-31-0001-5050.

Descriptors: *Phosphorus compounds, Storage, *Algae, *Cycling nutrients, *Water pollution effects, Adsorption, Wisconsin, Lake Michigan, Phosphates, Biomass, Metabolisming, Phytoplankton, Eutrophication, Model studies, Bays.
Identifiers: *Green Bay(Wis), Lean's model.

Steep gradients in phosphate and phytoplankton biomass concentrations along a transect extending 15 km into Green Bay from the mouth of the Fox River contrast greatly with apparently uniform phosphorus cycling rates between algae and water in the same area. The luxury stoage of phosphorus by algae, expressed on a per unit biomass base, is nearly the same at all stations along the transect and in excess of value thought to indicate phosphorus-limited conditions. It is suggested that similarities in turnover rates of phosphorus per unit biomass algae are due to the availability of phosphate in the water at levels well in excess of limiting concentrations leading to a saturation effect in phosphorus metabolism by the phytoplankton. A modification of Lean's four compartment model of the transfer of phosphorus between soluble and particulate forms in the epilimnion of lakes is necessary to make the model consistent with certain observed transfer curves. By splitting the particulate compartment into two distinct fractions and incorporating appropriate transfer coefficients, differential rates of exchange with the particulate compartment can be simulated. At least two different rates of exchange with the particulate compartment appear to be necessary to make the model consistent with experimentally observed, diphasic phosphorus transfer curves.
W76-11332

TOXICITY: RESEARCH AND REGULATION,
B. C. Research Ltd, Vancouver.
C. C. Walden, and T. E. Howard.
In: TAPPI Environmental Conference, Atlanta, Georgia, April 26-28, 1976, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 93-99. 58 ref, 2 tab.

Descriptors: *Pulp wastes, *Toxicity, *Research and development, *Regulation, *Canada, Wastes, Industrial wastes, Water pollution sources, Foreign countries, Salmon, Fish, Phytoplankton, Algae, Invertebrates, Lignins, Aquatic life, Lethal limit, Foam fractionation, Effluents, Water pollution treatment, Water pollution effects, Legislation.
Identifiers: *Fraser River(British Columbia), Resin acids, Fatty acids, Juvabione, Hormones.

Toxicity of pulp and paper mill effluents has been of major environmental significance in Canada since 3 bleached kraft mills were built in the 1960's in the Fraser River watershed of British Columbia, one of the world's major salmon-producing waters. Since then, regulatory control of the toxicity of Canadian pulp and paper mill discharges has been established at the federal and, in some instances, at the provincial level. Acute toxicity of most pulp effluents to fish (salmon) has been extensively documented. Current studies are examining the toxicity to invertebrates and phytoplankton (algae). Nonvolatile toxic constituents of many pulp effluents have been identified, in most cases accounting for all of the toxicity. Toxicants include resin acids and unsaturated fatty acids and various derivatives thereof, juvabione ('paper factor'), and related compounds, and chlorinated lignin derivatives. Substantial sublethal studies have been directed to assessing the effluent concentration below which no stress is exerted on aquatic organisms. Considerable evidence exists which indicates that this concentration is about 0.05-0.10 of the 96-hr LC(50) value. The efficiency of biotreatment studies in detoxifying effluents has been examined. Foam fractionation for detoxification is also being considered. (Sykes-IPC)
W76-11374

ACUTE TOXICITIES OF SPRUCE AND HEMLOCK BARK EXTRACTS TO SOME ESTUARINE ORGANISMS IN SOUTHEASTERN ALASKA,
Alaska Dept. of Fish and Game, Petersburg.
D. V. Buchanan, P. S. Tate, and J. R. Moring.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 5, p 1188-1192, May, 1976. 1 fig, 12 ref, 2 tab.

Descriptors: *Bark, *Toxicity, *Estuaries, Aquatic life, *Water pollution effects, Shrimp, Crabs, Salmon, Pink salmon, Fish, Hemlock trees, *Alaska, Lumbering, Water pollution sources, Pollutans, Aquatic animals, Pink shrimp, Water pollution, Lethal limit, Water quality, Wood wastes, Softwood, Coniferous trees.
Identifiers: Sitka spruce(Picea sitchensis), Western hemlock(Tsuga heterophylla), Dungeness crab(Cancer magister).

Sitka spruce (Picea sitchensis) bark extracts were found to be toxic to adult and larval pink shrimp (Pandalus borealis) and larval Dungeness crab (Cancer magister). Sitka spruce and western hemlock (Tsuga heterophylla) bark extracts were found to be toxic to pink salmon (Oncorhynchus gorbuscha) fry. For salmon fry, toxic effects were observed as soon as 3 hr after exposure to hemlock bark extracts. After a 96-hr exposure, 50% of the test fry were killed at a concentration of 56 mg/liter, 96-hr LC(50). With a 96-hr exposure of spruce extracts, 50% of the fry were killed at concentrations of 100-120 mg/liter. Spruce bark extracts were consistently toxic to all invertebrates tested. The 96-hr LC(50) with larval shrimp, adult shrimp, and larval crabs were 415, 205, and 530 mg/liter, respectively. Using loss of swimming as the criterion, the 96-hr EC(50) for larval shrimp and larval crabs were 155 and 255 mg/liter respectively; EC(50) = medium effective concentration. Spruce bark pulp was 2-6 times more toxic than were extracts to shrimp larvae. (Witt-IPC)
W76-11393

ON-SITE BIOASSAY TESTING AT CARIBOO PULP AND PAPER,
Cariboo Pulp and Paper Co., Quesnel (British Columbia).
R. J. Salmons, and V. E. Johnson.
Pulp and Paper Canada, Vol. 77, No. 5, p 85-86 (T90-91), May, 1976. 1 fig, 2 ref.

Descriptors: *Bioassay, *Toxicity, *Rainbow trout, *Testing procedures, *Pulp wastes, Testing, Equipment, Fish, Effluents, Wastes, Industrial wastes, Water pollution sources, Water pollution effects, *Canada, Foreign countries, Labor, Scientific personnel, Pulp and paper industry, Water pollution control, Water quality control, Monitoring, Pollutant identification.

On-site bioassays with rainbow trout carried out by technical personnel at Cariboo Pulp and Paper Co. (British Columbia) have produced reliable and reproducible results without the use of expensive equipment. Only a few man-hrs/week are necessary to maintain equipment (e.g., glass-fiber holding tanks) and keep a healthy fish stock. The program has proven invaluable both as an effluent toxicity monitor and as a means of determining problem areas in the mill process. (Sykes-IPC)
W76-11394

MERCURY LEVEL AS A FUNCTION OF SIZE AND AGE IN NORTHERN PIKE, ONE AND FIVE YEARS AFTER THE MERCURY BAN IN SWEDEN,
Naturhistoriska Riksmuseet, Stockholm (Sweden).
M. Olsson.
Ambio, Vol. 5, No. 2, p. 73-76, 1976. 2 fig., 4 tab., 25 ref.

Descriptors: *Mercury, *Size, *Pikes, Water pollution effects, *Length, *Pulp wastes, Water quality control, *Absorption, Freshwater fish, Path of pollutants, Public health, Metabolism, Analytical techniques, Fish physiology, *Aging(Biological).
Identifiers: Tissue analysis, *Esox sp., *Sweden.

Mercury levels in a pike population in a lake previously polluted by a papermill decreased after the mercury discharge from the mill ceased. Of five tested parameters of size, length correlated best with mercury levels. For this correlation a significant difference was found between the sexes: males (which grow more slowly) had higher levels than females. Male pike of different ages but the same length showed similar mercury levels. Results indicated that mercury levels in pike increase during starvation. (Katz)
W76-11401

A COMPARATIVE STUDY OF THE EFFECTS ON THE MARINE ENVIRONMENT OF WASTES FROM CELLULOSE INDUSTRIES IN SCOTLAND AND SWEDEN,
Dunstaffnage Marine Research Lab., Oban (Scotland).
T. H. Pearson, and R. Rosenberg.
Ambio, Vol. 5, No. 2, p. 77-79, 1976. 5 fig., 16 ref.

Descriptors: *Bioindicators, *Pulp wastes, Water pollution effects, *Sediments, *Fjords, Ecosystems, Biological communities, *Succession, Populations, *Benthic fauna, *Productivity, Water pollution sources, Benthos, Mollusks, Organic wastes, Analytical techniques, Invertebrates, Biomass.
Identifiers: *Species diversity, *Scotland, *Sweden.

Environmental conditions in two fjordic systems, one in Scotland and one in Sweden, are described and compared. Successional changes in the benthic fauna of the two systems are compared, primarily in relation to the input of organic material from the effluents of pulp and paper mill. Quantitative data are presented on the number of species present, together with abundance and diversity, changes in all of which show similarities in both areas. The relationship between faunal structure and sediment structure is considered; the use of benthic fauna to assess and predict the effect of organic pollution is discussed, and different methods of data presentation are assessed. (Katz)
W76-11402

OLIGOTROPHICATION - A SELF-ACCELERATING PROCESS IN LAKES SUBJECTED TO EXCESSIVE SUPPLY OF ACID SUBSTANCES,
Institute for Water and Air Pollution Research, Stockholm (Sweden).
O. Grahn, H. Hultberg, and L. Landner.
Ambio, Vol. 3, No. 2, p. 93-94, 1974. 2 fig., 14 ref.

Descriptors: *Hydrogen ion concentration, *Acidic water, Aquatic populations, Ecosystems, Environmental effects, *Lakes, *Biomass, *Calcium, Chemical properties, Populations, *Oligotrophy, *Lake stages, *Biota, Mollusks, Mayflies, Balance of Nature, Trophic level, Benthos, Productivity, Mosses, Sampling, Eutrophication, Water pollution effects.
Identifiers: *Oligotrophication, *Sweden.

From integrated biological studies of six acidified lakes (pH values between 4.4 and 5.4) in western Sweden, it has been concluded that primary changes in the composition of plant and animal populations, caused by the supply of acid substances, induce other long-term changes that will perturb the entire lake ecosystem and accelerate further acidification. (Katz)
W76-11403

THE EFFECTS OF AQUEOUS EXTRACTS OF CRUDE OIL AND NAPHTHALENE ON THE PHYSIOLOGY AND MORPHOLOGY OF A FRESHWATER GREEN ALGA,
C. Soto, J. A. Hellebust, and T. C. Hutchinson.
Verhandlungen Internationale, Vereinigung Limnologie. Vol. 19, p. 2145-2154, November, 1975. 6 fig., 10 ref.

Descriptors: *Oil wastes, Water pollution effects, *Algae, *Toxicity, *Growth rates, *Absorption, *Plant morphology, *Primary productivity, Or-

ganic compounds, *Photosynthesis, Analytical techniques, Tracers, Laboratory tests, Carbon radioisotopes, Methodology, Electron microscopy, *Chlorophyta.
Identifiers: Sub-lethal effects, *Aqueous oil extracts, *Naphthalene, *Chlamydomonas sp.

Investigations were conducted to determine the effects of aqueous extracts of crude oil and naphthalene on Chlamydomonas angulosa in regard to several physiological and morphological parameters. Growth inhibition was dependent on the conditions of treatment and growth stimulation was observed in a 'closed' system containing aqueous crude oil extract. Photosynthetic capacity was immediately and almost completely inhibited following naphthalene treatment. Aqueous crude oil extracts produced a less severe effect. Cellular protein decreased to 66% of the original amount over a 7-day exposure to naphthalene. Recovery was rapid when returned to fresh medium. Napthalene-treated C. angulosa cells became nonmotile due to loss of flagella, developed granulation in the cytoplasm and membrane-like material enveloped the cell. Other morphological changes were observed with both the light and electron microscopes. Similar, but less severe, changes were observed with aqueous crude oil extracts. (Katz)
W76-11404

FIELD STUDIES ON THE PHYTOTOXICITY OF CRUDE OIL TO SUBARCTIC AQUATIC VEGETATION,
B. M. Hanna, J. A. Hellebust, and T. C. Hutchinson.
Verhandlungen Internationale, Vereinigung Limnologie, Vol. 19, p. 2165-2171, November, 1975. 4 fig., 2 tab., 4 ref.

Descriptors: Oil, *Oil spills, Water pollution effects, *Primary productivity, Productivity, *Algae, *Chlorophyll, *Baseline studies, Mosses, *Subarctic, *Toxicants, On-site investigations, Biomass, Plant growth, Plant populations, Oil pollution, Lake shores, Cold regions, Toxicity, Permafrost, Methodology, *Phytotoxicity.
Identifiers: *Horsetails, *Sedges, Equisetum sp., Carex sp.

To determine the effect of an oil pipeline spill on lakes and ponds in the arctic, oiled and control test cylinders were established in a small lake. Algal species showed reduced productivity after introduction of crude oil into the system. Moss also showed a reduction in productivity that was not statistically significant in terms of control productivity. Chlorophyll a and b concentrations for sedge and horsetails showed significant reductions from surface contamination with oil. Baseline data on several growth parameters of a vegetative subarctic aquatic community were established. (Katz)
W76-11405

PROCEEDINGS, SEVENTEENTH CONFERENCE ON GREAT LAKES RESEARCH, PART 2.
For primary bibliographic entry see Field 2H.
W76-11424

THE ABUNDANCE OF DIATOMS IN THE SOUTHWESTERN NEARSHORE REGION OF LAKE ONTARIO DURING THE SPRING THERMAL BAR PERIOD,
State Univ. of New York Coll. at Buffalo. Great Lakes Lab.
For primary bibliographic entry see Field 2H.
W76-11425

PHYTOPLANKTON BIOMASS, SPECIES COMPOSITION AND PRIMARY PRODUCTION AT A NEARSHORE AND A MIDLAKE STATION OF LAKE ONTARIO DURING IFYGL,
Canada Centre for Inland Waters, Burlington (Ontario).
M. Munawar, P. Stadelmann, and I. F. Munawar.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 629-652, 1974. 8 fig, 8 tab, 55 ref.

Descriptors: *Phytoplankton, *Biomass, *Primary productivity, *Lake Ontario, Plankton, Nannoplankton, Surveys, Sampling, Chlorophyll, Algae, Diatoms, Dinoflagellates, Productivity, Nutrients, Water temperature, Size, Lakes, Limnology, Biology.
Identifiers: *International Field Year for the Great Lakes, Nearshore, Midlake, Species composite, Netphytoplankton.

As part of the Canadian contribution to the International Field Year for the Great Lakes (IFYGL), qualitative and quantitative analyses of phytoplankton were carried out at a nearshore and a mid-lake station. Samples were collected on two consecutive days by an integrating sampler (0-10 m) during nine cruises extending from April 1972 to March 1973. Simultaneously, chlorophyll a samples were taken, and carbon-14 uptake was measured in an incubator. About one hundred taxa were identified in samples from each station and contained several phytoflagellates and 'less common' species neglected in other IFYGL investigations. On a biomass basis the 'less common' species contributed significantly to the total phytoplankton biomass. The dominance of phytoflagellates for most of the year at both stations was striking. Similarly, nannoplankton (less than 64 micron) dominated the phytoplankton at both stations throughout the study period. At times more than 85% of the total photosynthesis was due to the nannoplankton fraction. At the nearshore station, phytoplankton biomass and chlorophyll a ranged from 0.2 to 2.3 g/cu m and 1.9 to 8.0 mg/cu m respectively. At the midlake station, the phytoplankton biomass and chlorophyll a ranged from 0.2 to 1.6 g/cu m and from 1.0 to 7.7 mg/cu m respectively. On a volumetric basis, the production/biomass quotient (activity coefficient) ranged between 0.002 to 0.026/hr and 0.002 to 0.02/hr at the nearshore and midlake stations respectively. (See also W76-11424) (Sims - ISWS)
W76-11426

A PRELIMINARY STUDY ON THE OCCURRENCE AND DISTRIBUTION OF GEOFUNGI IN LAKE ONTARIO NEAR THE NIAGARA RIVER,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2H.
W76-11427

BACTERIAL POPULATIONS IN LOWER GREEN BAY,
Wisconsin Univ. Green Bay, Coll. of Environmental Sciences.
For primary bibliographic entry see Field 2H.
W76-11428

PHOSPHATE, ALGAE, AND TACONITE TAILINGS IN THE WESTERN ARM OF LAKE SUPERIOR,
Texas Univ. at Dallas. Richardson. Inst. for Environmental Sciences.
R. H. Plumb, Jr., and G. F. Lee.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 2; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 823-836, 1974. 7 fig, 3 tab, 26 ref.

Descriptors: *Phosphates, *Algae, *Mine wastes, *Lake Superior, Eutrophication, Phosphorus compounds, Water pollution sources, Water quality, Phosphorus, Environmental effect, Waste disposal, Lakes, Surveys, Sampling, Leaching, Laboratory tests, Nutrients, Bioassay, Sorption, Primary productivity, Limnology.
Identifiers: *Taconite tailings.

The purpose of this investigation was to evaluate the significance and availability of phosphate associated with taconite tailings that are presently being discharged into the Minnesota waters of Lake Superior. Laboratory leaching studies showed that phosphate would not be leached from tailings in measurable quantities during a three year period and that phosphate from this source is insignificant compared to other sources in the study area. In addition, laboratory bioassays with Selenastrum and Lake Superior algae as well as in situ bioassays demonstrated tailings to be nonstimulatory and non-toxic. Since an observation of the primary productivity distribution in the western area, Lake Superior showed no apparent effect in the discharge area and agreed with the measured and calculated phosphate flux distribution, it was concluded that the discharge of taconite tailings would not contribute to the eutrophication of the lake. (See also W76-11424) (Sims - ISWS)
W76-11441

POPULATION DYNAMICS AND PRODUCTION OF DAPHNIA HYALINA IN A EUTROPHIC RESERVOIR,
Freshwater Biological Association, Wareham (England). Windermere Lab.
D. G. George, and R. W. Edwards.
Freshwater Biol. 4(5); p 445-466, 1974.

Descriptors: Algae, Cyanophyta, Daphnia, *Eutrophication, *Primary productivity, Reservoirs, Food chains, Water pollution effects.
Identifiers: *Daphnia-Hyalina, Eglwys Nynydd(S. Wals).

The population dynamics and production of D. hyalina, the dominant cladoceran in Eglwys Nynydd, a shallow eutrophic reservoir in South Wales, were studied for 2 yr against a background of limnological measurements. The appearance and development of successive generations from egg to adult could be followed from changing numbers in arbitrarily defined size classes. Seasonal variations in mean length, mean brood-size and proportion of gravid adults were recorded and mean brood-size was related to changing food and temperature conditions. Egg-development times for D. hyalina were determined in culture and the population parameters finite birth (B), instantaneous birth (b'), instantaneous population change (r'), instantaneous death (d') and finite death rates (D) were estimated from field data. Turnover and production estimates were calculated from finite death rates and biomass. The calculated potential rate of increase (b') was nearly always greater than the observed rate of increase (r'): seasonal changes in death rate (d') generally parallel changes in birth rate (b') but remain somewhat out of phase. Population oscillations are probably due to a delay in the expression of the effects of population density upon birth and death rates. The production of Daphnia accounts for less than 2% of gross primary production. However, the pattern of population growth of Daphnia in Eglwys Nynydd almost certainly reflects a food limited system. In summer, blue-green algae may be abundant but serve as a poor food source.--Copyright 1975, Biological Abstracts, Inc.
W76-11457

OBSERVATIONS ON THE EFFECTS OF CRUDE OIL POLLUTION ON THE SANDY-BEACH SNAIL, BULLIA (GASTROPODA:PROSOBRANCHIATA),
Cape Town Univ. (South Africa). Dept. of Zoology.
A. C. Brown, P. De B. Baissac, Leon, and Belle.
Trans R Soc S Afr. 41(1); p 19-24, 1974.

Descriptors: *Oil pollution, *Snails, Water pollution effects, Weathering.
Identifiers: Bullia, Crude oil, Gastropoda, Prodobranchiata, Snail.

The effect of crude oil on Bullia was observed in the field, following an oil spill, and in the laboratory, using a light Arabian oil. Well-defined stress symptoms appear at sub-lethal concentrations; at higher doses these give way to paralysis before death ensues. Very low concentrations are fatal if there is contact between the animals and the oil, even if the oil has been weathered. If there is no direct contact much higher concentrations of fresh oil can be tolerated and weathering greatly reduces toxic effects. Mass mortality is unlikely to occur through eating oil-contaminated food.--Copyright 1974, Biological Abstracts, Inc.
W76-11459

THE ALERT BAY OIL SPILL: A ONE-YEAR STUDY OF THE RECOVERY OF A CONTAMINATED BAY,
Environment Canada, Victoria, B. C. (Canada). Marine Sciences Directorate, Pacific Region.
D. R. Green, C. Bawden, W. J. Cretney, and C. S. Wong.
Pacific Marine Science Report No. 74-9, June 1974. 43 p, 3 ref.

Descriptors: *Continental shelf, *Canada, *Oil spills, *Oil pollution, *Environmental effects, Ecology, *Fossil fuels, Chemistry, Bacteria, Weathering, Pollution, Bays.
Identifiers: Outer Continental Shelf, *British Columbia, Cormorant Island(BC), Biological effects.

On January 24, 1973, the freighter Irish Stardust grounded on Haddington Reef rupturing two fuel tanks, and spilling roughly 200 tons of heavy '1000 second' fuel oil into Broughton Strait. The majority of this oil was deposited along the shores to the east by the receding high tide on the morning of January 25. The town of Alert Bay on Cormorant Island was the community most affected. Major clean-up operations were conducted on the beaches of Cormorant Island and other islands further to the east. However, one of the more contaminated bays was sufficiently isolated that it could be left undisturbed for scientific study. This bay was code-named Reserved Bay. Only those species that were in direct contact with oil seem to have been harmfully affected, particularly limpets and periwinkles. No species has been completely eliminated, and there are indications that recolonization is occurring. It appears that there will no be any permanent effects on the biological community at Reserved Bay. The pattern of contamination remained identical throughout the yearlong study, with the exception of the oiled rockweed and sand, which were gradually removed. The major mechanism for altering the chemistry of the oil in the bay was the action of bacteria. The beach at Reserved Bay was still polluted by oil one year after the spillage occurred. However, approximately 90-95% of the volume of the oil had been removed by various natural processes, and the area was beginning to recover from the relatively small amount of biological damage that had occurred. (Sinha - OEIS)
W76-11463

ENVIRONMENTAL IMPACTS OF OCS OIL AND GAS ACTIVITY,
University of South Florida, Tampa. Dept. of Geography.
For primary bibliographic entry see Field 6G.
W76-11471

SOUTHEAST COASTAL RESEARCH ACTIVITIES OF ERDA,
Division of Biomedical and Environmental Research (USERDA), Washington, D. C.
For primary bibliographic entry see Field 6G.
W76-11477

BIOLOGICAL CONSIDERATIONS,
Duke Univ., Beaufort, N. C. Marine Lab.
For primary bibliographic entry see Field 6G.
W76-11484

AN INTEGRATED STUDY ON THE IMPACT OF METALLIC TRACE ELEMENT POLLUTION IN THE COEUR D'ALENE-SPOKANE RIVERS-LAKE DRAINAGE SYSTEM,
Washington State Univ., Pullman. Dept. of Sanitary Engineering.
W. H. Funk, F. W. Rabe, R. Fibly, G. Bailey, and P. Bennett.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 724, $40.00 in paper copy, $3.00 in microfiche. Joint Project Completion Report Between Washington State University and the University of Idaho, August 1975. 332 p, 89 fig, 81 tab, 166 ref, 4 append. OWRT C-4145(9060)(4).

Descriptors: *Metals, *Trace elements, *Heavy metals, *Washington, Lakes, Rivers, *Food chains, *Productivity, Water quality, Absorption, Zinc, Drainage systems, Copper, Neutron activation analysis, Pollutant identification, Water pollution effects, Iron.
Identifiers: *Trace metals, Coeur d'Alene Lake(Wash), Spokane River(Wash).

Comprehensive limnological, water quality, productivity and substrata investigations have been made of the Coeur d'Alene drainage, Coeur d'Alene Lake and the Spokane River. These investigations were made in an attempt to answer questions as to the passage of metallic elements through the aquatic food chain in the study area as well as to determine the critical factors involved in the poor recovery of the South Fork and main stem of the Coeur d'Alene River. Additional work was carried out to determine the water quality of these areas and the Spokane River. Extensive studies were also made upon the substrata and limiting factors for macroinvertebrates of the Upper Spokane River. Heavy metals, such as Zn, Cu, and Pb, appear to be concentrated to relatively high amounts in algae, aquatic macrophytes and other vegetation growing along the river. Algae and detritus-consuming macroinvertebrates pass these metals along to the fishes. However, there appears to be a reduction of concentration of metals in tissues at each trophic level as one moves up the food chain. The organisms appear to be actively excreting the metals. In the fishes, the filter bodies such as the kidneys and liver confirm this assumption. Nonetheless, the level of Zn, for example, in the muscle tissues of Spokane River fishes may be two to three times that in muscle tissues of the same species taken from undisturbed streams high in Coeur d'Alene drainage. For these reasons it has been concluded that additional efforts should be made to curtail and control seepage from tailings ponds as well as reduction and eventual control of wastes and nutrient runoff in the Coeur d'Alene and Spokane river drainage basins.
W76-11488

AN ENVIRONMENTAL ASSESSMENT OF IMPACTS OF COAL DEVELOPMENT ON THE WATER RESOURCES OF THE YAMPA RIVER BASIN, COLORADO AND WYOMING--PHASE-II WORK PLAN,
Geological Survey, Denver, Colo.
T. D. Steele, I. C. James, II, and D. P. Bauer.
Open-file report 76-368, May 1976. 33 p, 2 fig, 2 tab, 60 ref.

Descriptors: *Environmental effects, *Coal mine wastes, *Water pollution sources, *Energy conversion, *Project planning, Evaluation, Projections, Water resources development, Water rights, Water quality control, Water demand, River basin development, Public lands, Land use, Rehabilitation.
Identifiers: *Yampa River Basin(Colo-Wyo), Residuals management.

The Yampa River Basin Assessment in Colorado and Wyoming is a 2.5-year program of the U.S. Geological Survey. It is designed primarily to assess the availability and quality of the basin's water resources. The basin assessment also will evaluate potential environmental and selected socioeconomic impacts of energy-resource development plans proposed by mining and power companies. This report serves as a project work plan for the basin assessment. It describes the program objectives, and the various approaches of analysis and evaluation. Environmental studies are outlined for analyzing both the direct effects of various proposals regarding coal mining, transportation, and conversion, and the secondary effects resulting from increased population and urban growth. The basin assessment is designed to provide Federal, State and local decision-makers with the basic environmental information needed to formulate and to evaluate policies for the development of energy resources. The techniques applied and conclusions reached in the Yampa River Basin Assessment should aid similar studies in other energy-rich basins in the Western United States. (Woodard-USGS)
W76-11500

RECENT CHANGES IN ATLANTIC SALMON (SALMO SALAR) RUNS IN THE LIGHT OF ENVIRONMENTAL CHANGES IN THE SAINT JOHN RIVER, NEW BRUNSWICK, CANADA,
Environmental Protection Service, St. John's (Newfoundland).
C. L. Dominy.
Biol Conserv. 5(2), p 105-113, 1973.

Descriptors: *Atlantic salmon, *Canada, Rivers, Environmental effects, Waste disposal, *Organic wastes, *Toxicity, Waste assimilative capacity, Water quality, Pollution abatement, Industrial wastes.
Identifiers: *Saint John River(N.B.).

Deterioration of water quality as a result of the disposal of untreated organic and toxic wastes into the Saint John River Basin began when the river was 1st settled in 1604, and the amount of waste entering the river has increased substantially over the past 2 decades. Hydroelectric power developments constructed on the main stem of the river during this recent period have added to the problem by reducing the biological assimilative capacity of the river. The significance of these cultural influences for atlantic salmon (S. salar) in the river has been to reduce the quality of its migration route to and from the sea, to eliminate some of its freshwater spawning and rearing areas, and to cause direct mortality of adult and juvenile salmon. As a consequence, the total salmon stock in the Saint John River has declined by approximately 40% over the past 2 decades. The future prospects for conserving this valuable natural resource in the Sant John River are moderately bright in view of current activities in water pollution abatement, effective regulation of the salmon fisheries, and large-scale artificial propagation.--Copyright 1973, Biological Abstracts, Inc.
W76-11508

EFFECT OF PYRIDINE DISSOLVED IN WATER ON THE GASTRIC AND INTESTINAL MUCOSA OF EXPERIMENTAL ANIMALS, (IN RUSSIAN),
Ternopol State Medical Inst. (USSR).
V. A. Kondratyuk.
Gig Sanit. 11, p 87-88, 1974.

Descriptors: Potable water, *Toxicity, Calcium, Magnesium, Ions, Organic compounds, *Pyridine pesticides, Rodents.
Identifiers: *Intestinal mocosa.

Experiments on male white rats established that Ca ions contained in drinking water intensify the toxic effect of pyridine to a greater degree than Mg ions. On the basis of this data, the presently existing maximum allowable concentration pyridine in water bodies is too high if the ion composition of

drinking water is taken into account.--Copyright 1975, Biological Abstracts, Inc.
W76-11526

HYGIENIC EVALUATION OF AN EPOXY COMPOUND AND THE POSSIBILITY OF ITS USE IN SUBMERSIBLE ELECTRIC PUMPS FOR DOMESTIC PURPOSES, (IN RUSSIAN),
Kiev Research Inst. of General Communal Hygiene (USSR).
V. V. Tsapko, V. N. Kupyrov, V. I. Vorobets, L. P. Vlasova, and G. A. Dolgikh.
Gig Sanit. 10, p 106-107, 1974.

Descriptors: *Organoleptic properties, Oxidation, *Organic compounds, *Animal pathology, Pumps, Rodents, Public health, Toxicity.
Identifiers: *Epoxy compounds, Polyethylene polyamine.

Epoxy compound OKE.504.004, intended for waterproofing the windings of motors of domestic submersible electric pumps, on contacting water for 1 mo. does not affect the organoleptic properties of water. A study of its chemical composition showed an increase of oxidizability and traces of polyethylene-polyamine. Pathological investigations on rats (6-mo. experiment) showed that water in long contact with the epoxy compound causes hemodynamic disorders in the liver, kidneys and adrenal glands, functional changes of the CNS and an increase of the content of ascorbic acid in the adrenal glands and of RNA in the liver. The epoxy compound should not be used for domestic drinking water supply systems, but can be used for waterproofing motors in pumps for watering gardens, washing cars, laundering and other domestic purposes.--Copyright 1975, Biological Abstracts, Inc.
W76-11528

HYGENIC EVALUATION OF IONIC COMPOSITION OF AN IMITATION OF DESALINATED SEA WATER, (IN RUSSIAN)
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
T. K. Parkhomchuk, Yu. V. Novikov, A. F. Aksyuk, Z. A. Anisimova, and A. N. Sergeev.
Gig Sanit. 4, p 22-26, 1974. (In Russ. with Engl. summ.).

Descriptors: *Sea water, *Desalination, *Ions, Public health, Potable water, Rodents, Metabolism, Water treatment, Water quality standards.

Imitation desalinated sea water, with salt content within the levels stipulated by the drinking water standard, caused no disturbances of the examined physiological processes in rats. Prolonged use of imitation desalinated sea water with excessive or low salt content produced in rats functional shifts in the fluid-electrolyte metabolism processes and a strain on adaptation mechanisms and morphological changes in the CNS.--Copyright 1975, Biological Abstracts, Inc.
W76-11529

HYGIENIC EVALUATION OF POLYCHLOROPINENE AND ALKYLBENZENE SULFONATE PRESENT TOGETHER IN SURFACE WATERS, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Epidemiologii, Mikrobiologii i Gigieny, Vilnius (USSR).
D. G. Krasil'shchikov.
Gig Sanit. 10, p 99-100, 1974.

Descriptors: Public health, *Alkylbenzene sulfonates, Organic compounds, *Pesticide residues, *Chlorinated hydrocarbon pesticides, Rodents, Toxicity, Water pollution effects, Detergents, Lethal limit.
Identifiers: *Polychloropinene.

Under model conditions alkylbenzene sulfonate (ABS) and its binary mixtures with the pesticide polychloropinene in concentrations exceeding the maximum allowable concentration (MAC) by 5-fold and more caused inhibition of the level of O2 consumption, the extent of which depended on the concentration of the substances added to river water. Their combined pollution of surface waters can lead to deterioration of the natural self-purification of water from organic pollutants. The long-time intake of polychloropinene, with water at dose levels exceeding the MAC by 10-fold led to the development of functional shifts in rats, and the simultaneous presence of ABS in the water intensified the effect of the pesticide. In concentrations amounting to 1/2 and 1 MAC both substances and their mixtures were inactive with respect to the indices during 7-mo. peroral poisoning of rats.--Copyright 1975, Biological Abstracts, Inc.
W76-11530

THE PROBLEM OF MERCURY IN THE MEDITERRANEAN, (IN FRENCH),
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
For primary bibliographic entry see Field 5B.
W76-11531

BACTERIOCOENOTIC STUDIES ON A WEAKLY DYSTROPHIC STREAM, (IN GERMAN),
K. W. Kuchar.
Sydowia Ann Mycol. 26(1-6), p 32-40, 1972.

Descriptors: Hydrogen ion concentration, Pseudomonar, *Bacteria, *Dystrophy, Oligotrophy, *Pollutant identification, Streams.
Identifiers: *Bacteriocenotic studies, *Dystrophic streams, Biotopes.

A small weakly dystrophic stream of an oligozoic type with a low biotope quotient is characterized by its low alkalinity and by its quantitatively and qualitatively poor biocoenos. This is reflected in the species-and colony-poor bacteriocoenose. Quantitative control methods in the field detected gram negative species; in particular, pseudomonads.--Copyright 1975, Biological Abstracts, Inc.
W76-11533

BACTERIOCOENOTIC STUDIES ON AN OLIGOTROPHIC STREAM, (IN GERMAN),
K. W. Kuchar.
Sydowia Ann Mycol. 26(1-6), p 184-189, 1972.

Descriptors: Bacteria, *Oliotrophy, *Pseudomonas, *Pollutant identification, Streams.
Identifiers: *Bacteriocenotic studies, Oligotrophic streams, Vibrio sp.

A small oligotrophic stream is characterized by a bacteriocoenose in which pseudomonads predominate (81%). Vibrio sp. comprised 15% of the total colony. Gram positive non-spore-producers were not present.--Copyright 1975, Biological Abstracts, Inc.
W76-11534

BACTERIOCOENOSE STUDIES ON AN EUTROPHIC BIOTOPE, (IN GERMAN),
K. W. Kuchar.
Sydowia Ann Mycol. 26(1-6), p 190-198, 1972.

Descriptors: *Bacteria, Eutrophication, *Pseudomonas, Seasonal, Pollutant identification.
Identifiers: *Bacillus, *Bacteriocenotic studies, *Callitriche, *Eutrophic biotopes.

A clearly eutrophic Callitriche-biotope is characterized in its summer aspect by a bacterial association made up of 4 components: up to 37% Pseudomonas, up to 35% gram negative non-pseudomonads, up to 21% gram positive non-spore-producers, and 1% Bacillus spp..--Copyright 1975, Biological Abstracts, Inc.
W76-11535

INVERTEBRATE FAUNA OF THE LAKES OF THE LOWER TAREYA RIVER (WESTERN TAIMYR), (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Invertebrate Zoology.
N. M. Shalaeva.
Vestin Mosk Univ Ser 6 Biol Pochvoved. 29(6), p 3-7, 1974.

Descriptors: *Invertebrates, *Lakes, Rivers, *Rotifers, *Eutrophication, *Oligotrophy, Reservoirs, Ponds, Zooplankton, Daphnia.
Identifiers: Acanthocyclops-Capillatus, Asplanchna-Sp, Daphnia-Arctica, Daphnia-Pulex, Diaptomus-Bacillifer, Eucypris-Clacialis, Eurycercus-Clacialis, Heterocope-Borealis, Lepidurus-Arcticus, Polyartemia-Forcipata, Polyarthra-Sp, *USSR(Lower Tareya River), Western Taimyr.

Small lakes and pools around the Taimyr station (Russian SFSR, USSR) maintain a fairly diverse fauna of invertebrates. There are some oligotrophic and eutrophic reservoirs as well as intermediate ones. The few small distrophic reservoirs are shallow with the brown water rich in humic acids. The zooplankton of oligotrophic lakes is characterized by the great variety of wheel-animalcules (Rotifera) as compared with other types of reservoirs. Zooplankton analysis showed some common forms (Diaptomus bacillifer, Daphnia pulex, Asplanchna, Polyarthra), and a number of northern species (Heterocope borealis, Acanthocyclops capillatus, D. arctica, Eurycercus glacialis, Eucypris glacialis, Lepidurus arcticus, Polyartemia forcipata).--Copyright 1975, Biological Abstracts, Inc.
W76-11537

BACTERIAL POPULATIONS IN SKADAR LAKE, (IN SERBO-CROATIAN),
Zavod Za Biologiju Mora, Kotor (Yugoslavia).
Bosiljka Ristanovic.
Glas Repub Zavoda Zast Prir Prir Muz Titogradu. 7, p 37-48, 1974.

Descriptors: *Bacteria, Lakes, Europe, *Oligotrophy, *Anaerobic bacteria, Bioindicators, Cultures, *Aerobic bacteria, Pollutant identification.
Identifiers: Azotobacter-Agilis, Azotobacter-Chroococcum, Beggiatoa-Alba, Beggiatoa-Leptomitiformis, Cellvibrio-Fulvus, Chromatium-Minus, Cytophaga-Lutea, Pseudomonas-Fluorescens, Siderocapsa, Spirillum-Volutans, *Yugoslavia(Skadar Lake).

During 1972-1973 aerobic and facultative anaerobic bacterial populations in different parts of oligotrophic Skader Lake (Yugoslavia) were investigated. The plate culture method was used. The total number of bacteria was 16-1500/ml of water. The lowest count was in the Radus upwelling spring area in May 1973 and the highest in the zone of macrovegetation in Dec. 1972. Dominant species were: Pseudomonas fluorescens Migula and Spirillum volutans Ehrenberg. Up to 34/ml nitrogen-fixing bacteria were found predominantly Azotobacter agilis Beijerinck and A. chroococcum Beijerinck. The number of cellulose-decomposing bacteria was as high as 10/ml. Dominant species were Cytophaga lutea Winogradsky and Cellvibrio fulvus Stap et Bortels which had marginal activity. Sulphur bacteria were Beggiatoa alba (Vaucher) Trevisan, B. leptomitiformis Trevisan and Chromatium minus Winogradsky. The only Fe bacterium detected was Siderocapsa major Molisch. Only 3.2%-14.5% of the ammonificators tested survived in media with a phenol concentration of 10 mg/l, and only 0.07%-2.6% on a phenol concentration of 200 mg/l. Bacteriological processes were probably not intensive in Skadar Lake because of the heavy stand of aquatic plants and favorable temperature and O2 relations. The transformation of organic matter is slow and scanty.--Copyright 1975, Biological Abstracts, Inc.
W76-11538

THE IMPORTANCE OF INHIBITING SUBSTANCES IN THE CONTROL OF ALGAL AND BACTERIAL POPULATIONS OF MARINE PLANKTON, (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
For primary bibliographic entry see Field 5G.
W76-11542

EFFECT OF SULFITE EFFLUENTS OF CELLULOSE-PAPER MILL ON VITALITY OF DAPHNIA MAGNA STRAUS, (IN RUSSIAN),
Akademiya Nauk Litovskoi SSR, Vilnius. Institut Zoologii i Parazitologii.
V. P. Klimashauskene.
Liet Tsr Mokslu Akad Darb Ser C Biol Mokslai. 1, p 111-120, 1974.

Descriptors: Daphnia, Effluents, *Pulp wastes, Cellulose, Yeast, Water pollution effects, *Industrial wastes, Sulfite liquors.
Identifiers: *Daphnia-Magna.

The effluent most harmful to D. magna was from a yeast shop. In undiluted effluent daphnias survived for 30-40 min. In 6.25-0.78% concentration dilutions of the effluent, they survived for 1-5 days. In 0.39% dilutions they remained viable for the whole testing time and showed a considerable increase in biomass, although a certain disturbance of development was noted. A 0.19% concentration is the maximum permissible concentration for normal development. Other types of effluent were less harmful. The maximum permissible effluent concentrations for crustacean survival were 3.125% for effluent from acid and barking shops and from cardboard, paper and pulp shops after a settler, and 6.25% for effluent from cardboard, paper and pulp shops after filters. The 3.125% effluent from cardboard, paper and pulp shops after filters, the 3.125% effluent from acid and barking shops and the 1.56% effluent after a settler showed no unfavorable effect on crustacean development.--Copyright 1975, Biological Abstracts, Inc.
W76-11544

EFFECT OF COPPER SULFATE ON MUCUS CELLS IN YOUNG TROUT (SALMO IRIDEUS), (IN FRENCH).
Toulouse-3 Univ. (France). Laboratoire d'Ecophysiologie des Animaux.
J. Pequignot, R. Labat, and A. Chatelet.
Eur J Toxicol Environ Hyg. 8(1), p 52-56, 1975.

Descriptors: *Copper sulfate, Trout, Cytological studies, Environmental effects, Water pollution effects, Metals, Copper.
Identifiers: Salmo-Irideus.

Mucus epithelia of young trouts poisoned by CuSO4 were observed. A decrease in the number of stained mucus cells in the skin and intestine was noticed. This response may indicate a slowing down of mucus secretion which couldbe typical of (environment pollutant) Cu poisoning.--Copyright 1975, Biological Abstracts, Inc.
W76-11545

THE EFFECT OF PREPARATION ON THE MERCURY CONTENT OF FISH AND MUSHROOMS, (IN GERMAN),
Bundesforschungsanstalt fuer Lebensmittelfrischhaltung, Karlsruhe (West Germany). Institut fuer Strahlen-technologie.
For primary bibliographic entry see Field 5A.
W76-11546

SANITARY-TOXICOLOGIC ASSESSMENT OF IRON COMPOUNDS, (IN RUSSIAN),
Gorodskaya Sanitarno-Epidemio logicheskaya Stantsiya, Moscow (USSR).
I. K. Lysogorova.
Gig Sanit. 5, p 16-19, 1974.

Descriptors: *Iron compounds, *Toxicity, Potable water, Rodents, Water pollution effects.

Fe present in drinking water was highly toxic to rats in acute and chronic experiments. In a chronic test a pronounced toxic effect was obtained at Fe concentrations of 1000 and 100 mg/l and lesser effect was found at a concentration of 10 mg/l. An inefficient dose amounted to 1 mg/l.--Copyright 1975, Biological Abstracts, Inc.
W76-11547

THE HYPOTHALAMO-HYPOPHYSEAL NEUROSECRETORY SYSTEM OF THE GUPPY LEBISTES RETICULATUS UNDER CHRONIC PHENOL INTOXICATION, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
V. E. Matei.
Zh Evol Biokhim Fiziol. 9(5), p 481-486, 1973.

Descriptors: *Phenols, *Toxicity, Water pollution effects, Fish.
Identifiers: Guppy, Intoxication, *Lebistes-Reticulatus, *Neurological fish studies(Hypothalamo-hypophyseal).

Phenol in minimal subtoxic concentrations enhances the activity of the hypothalamo-hypophyseal neurosecretory system (HHNS) of the fish. Higher concentrations of the agent induce active excretion of neurohormone from the HHNS up to its complete devastation. The neurohypophysis exhibits the highest reactivity under stress situations. Phenol intoxication results in phase changes in the HHNS, which are accompanied by disturbances in the higher nervous activity of fishes.--Copyright 1975, Biological Abstracts, Inc.
W76-11549

DDT AND ITS METABOLITES IN SOME CESTODES IN FISHES, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
I. I. Perevozchenko, and O. N. Davydov.
Gidrobiol Zh. 10(6), p 86-90, 1974.

Descriptors: *DDT, Fish, Absorption, *Pike, *Carp, Toxicity, Lethal limit, Water pollution effects.
Identifiers: Bothriocephalus-Gowkongensis, *Cestodes, Ligula-Intestinalis, *Metabolites(DDT), Triaenophorus-Nodulosus.

The ability of Bothriocephalus gowkongensis, Triaenophorus nodulosus and Ligula intestinalis to rapidly accumulate p,p'-DDT, p,p'-DDD and o,p'-DDD via their fish host (pike, carp) and in vitro was determined. A considerable resistance of cestodes in solutions of the toxicants lethal for their hosts (100 and 1000 micro-g/l) was noted. The ability of cestodes to dechlorinate p,p'-DDT was shown and distinct desorption of p,p'-DDD and its o,p'-isomer from tissues of the 'poisoned' L. intestinalis when placed in a normal Ringer's solution was noted. Preliminary experiments on the effect of p,p'-DDT on yearling carp showed that death among the fish infected with B. gowkongensis was greater than among the uninfected.--Copyright 1975, Biological Abstracts, Inc.
W76-11550

INCREASE OF PRIMARY PRODUCTION IN A BAY OF MALYI ZHEMCHUZHNYI ISLAND (NORTH CASPIAN) USING INORGANIC FERTILIZERS, (IN RUSSIAN),
Kaspiiskii Nauchno-Iseledovatelskii Institut Rynogo Khozyaistva, Astrakhan (USSR).
V. A. Vnukov, G. G. Evstigneev, and V. I. Konev.
Gidrobiol Zh. 10(4), p 90-94, 1974.

Descriptors: *Primary productivity, Bays, *Fertilizers, Inorganic compounds, *Phytoplankton, Lakes, Photosynthesis, Islands, *Phosphates, *Nitrates.
Identifiers: *Caspian Sea, USSR(Zhemchuzhnyi Island), Bay of Malyi.

Experiments in 2 bays on Malyi Zhemchuzhnyi Island (North Caspian) (USSR) showed that the application of superphosphate and ammonium nitrate in the experimental bay changed the quantitative content of biogenous elements in it: the content of phosphate P increased to 63.90 mg/m3 and NH3-N to 62.50 mg/m3 whereas in the control bay these values were, respectively, 22.05 and 47.00 mg/m3. Photosynthetic activity of phytoplankton increased in the experimental bay from 8.23-8.88 and in the control bay from 8.33-8.54. The presence of additional biogenous substances involved a marked increase of the gross primary production of plankton to 10.88 mgO2/l in the experimental bay vs. 0.65-5.07 mgO2/l in control.--Copyright 1975, Biological Abstracts, Inc.
W76-11553

EFFECT OF THE DEGREE OF VACUUM USED IN FILTRATION ON THE SIMULTANEOUS MEASUREMENT OF ASSIMILATION AND EXCRETION BY PHYTOPLANKTON ORGANISMS, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Abidjan (Ivory Coast). Centre de Recherches Oceanographiques.
A. Herbland.
Cah O R S T O M Ser Oceanogr. 12(3), p 173-178, 1974.

Descriptors: *Filtration, *Phytoplankton, Filters, Vacuum, *Absorption, *Measurement, Coasts, Organic matter, Pollutant identification.
Identifiers: Excretion(Phytoplankton), *Mauritania.

The amount of vacuum applied to draw water through the filter is an important source of error in determining, simultaneously, phytoplankton assimilation and organic excretion. An experiment made in coastal Mauritanian upwelled waters with a natural population, shows that the suction must not exceed 75 mm Hg. The reproducibility of total organic production, assimilation and excretion measurements is not disturbed by increasing suction while the reproducibility of the ration excretion: excretion + assimilation is better with low vacuum. The spatial heterogeneity of phytoplankton cells is an important cause of variability in primary production measurements, while a functional or physiological homogeneity exists in the sub-samples.--Copyright 1975, Biological Abstracts, Inc.
W76-11554

PRIMARY PRODUCTION IN THE MAURITANIAN UPWELLING IN MARCH 1973, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Abidjan (Ivory Coast). Centre de Recherches Oceanographiques.
A. Herbland, and B. Voituriez.
Cah O R S T O M Ser Oceanogr. 12(3), p 187-201, 1974.

Descriptors: Carbon radioisotopes, *Primary productivity, Organic matter, *Bacteria, Nutrients, *Phytoplankton, Zooplankton, Oxygen, *Chlorophyll, Nitrogen, Coasts, Absorption.
Identifiers: Carbon-14, *Mauritania.

Newly upwelled water was followed with a drogue for 6 days in the Mauritanian upwelling. The particulate organic production was estimated by 3 methods: the increase of chlorophyll a (delta Chla); the increase of particulate C (delta Cp) and the sum of daily C14 primary production. A comparison between these 3 methods shows a regular decrease (100-25) of the ratio Cp/Chla, good agreement between the 2nd and 3rd methods during the morning and a difference for 24 h periods probably due to nightly grazing (between 20-30% of the net

primary production). The dissolved organic production (phytoplankton excretion) was directly measured and estimated to be 42% of total organic production, but there is evidence of overestimation and it probably did not exceed 20%. The ratio excretion/excretion + assimilation had diel variations with higher values during the afternoon. The nutrient decrease and the chlorophyll a and O2 increase were very important in the morning, but weak or absent in the afternoon. Comparison of dissolved organic P in seawater with direct excretion of phytoplankton and zooplankton seems to show an immediate re-utilization of excreted dissolved organic compounds by heterotrophic bacteria. The atomic ratio of nutrients uptake vs. the C uptake delta C/delta. NO3/delta SiO3/delta PO4 were equal to 60/12/9/1. Silicate was the 1st nutrient deficient. Ammonia is taken up quickly but in small quantity compared to nitrate; nitrite appeared to be marginal in the main N flux. The evolution of O2 distribution cannot be explained by photosynthesis process only; there is evidence of important enrichment by atmospheric exchanges.--Copyright 1975, Biological Abstracts, Inc.
W76-11555

FEATURES OF FRESHWATER ECOSYSTEMS (FROM THE RESULTS OF SOVIET PARTICIPATION IN THE INTERNATIONAL BIOLOGICAL PROGRAM), (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institit.
G. G. Vinberg.
Izv Akad Nauk SSSR Ser Biol. 1, p 83-93, 1975.

Descriptors: *Bacteria, *Ecosystems, Freshwater, Lakes, Reservoirs, *Phytoplankton, *Predation, *Metabolism, Zooplankton.
Identifiers: *International Biological Program(USSR).

Investigations of energy flow in ecosystems of 10 lakes and 2 reservoirs of a different geographical location show a very large range of primary phytoplankton production (P1), 21-1758 kcal.m-2.yr-1. In spite of this the relative production values of bacterioplankton (Pb), non-predatory (P2) and predatory (P3) planktonic and benthic animals vary irregularly around mean values: Pb, 31 (20-46); P2, 10.3 (4.3-16.2) and P3, 49 (20-77). The expenditures for the metabolism of bacterio-, phyto- and zooplankton calculated on the basis of respective production values are in close positive correlation with P1 and, on the average, approach P1.--Copyright 1975, Biological Abstracts, Inc.
W76-11556

A STUDY OF THE QUALITY OF SILK REELING WATER IN REGARD TO SOLUBILITY OF COCOON-SERICIN, (IN JAPANESE),
Ministry of Agriculture and Forestry, Tokyo (Japan). Sericultural Experiment Station.
For primary bibliographic entry see Field 5B.
W76-11557

POSSIBILITY OF USING PHENOLIC RESINS IN HOUSEHOLD AND DRINKING WATER SUPPLY SYSTEMS, (IN RUSSIAN),
Vsesoyunznyi Nauchno-Issledovatelskii Institut Gigieni i Toksikologii Pestitsidov, Kiev (USSR).
Z. S. Tsam.
Gig Sanit. 3, p 117-118, 1975.

Descriptors: *Phenols, *Resins, Potable water, Water supply, Organoleptic properties, Organic compounds, Physicochemical properties.
Identifiers: Formaldehyde, *Phenolic resins.

Specimens of phenolic resins (molding powder K-17-23 and molding material AG-4V) adversely affected the organoleptic and physicochemical indices of household and drinking water quality and released into the water low-molecular-weight organic compounds, including phenol and formaldehyde, in quantities exceeding their maximum allowable concentration in water. Articles made of these phenolic resins are not recommended for use in household or drinking water supply systems.--Copyright 1976, Biological Abstracts, Inc.
W76-11560

THE PATTERNS OF 14C ACCUMULATION AND REMOVAL IN FRESHWATER FISHES, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
G. V. Fedorova.
Zh Obshch Biol. 35(4), p 631-639, 1974.

Descriptors: *Carbon radioisotopes, *Distribution patterns, Organic compounds, Inorganic compounds, *Carp, Freshwater fish, Fish pathology.
Identifiers: *Carbon-14, *Loach, *Guppy.

The patterns of accumulation and removal injected 14C both in organic and nonorganic compounds from the water, food, and food and water simultaneously were revealed in the organs and tissues of freshwater fishes (carp, guppy, loach, orfe). Liver, kidneys, gastrointestinal tract, gills, brain were found to accumulate 14C on a large scale. Muscles, skin and eyes accumulate 14C to a smaller extent. A different capacity for accumulation of 14C is observed at subcellular level in the mitochondria. In stomach mitochondria 14C accumulation proceeds much more extensively than in muscle mitochondria. The removal of 14C from the organs and tissues of fishes proceeds much slower as compared with accumulation irrespective of the means of administration.--Copyright 1975, Biological Abstracts, Inc.
W76-11561

MASS DESTRUCTION OF SYNTHLIBORAMPHUS ANTIQUUS BY OIL POLLUTION OF JAPAN SEA,
Niigata Prefecture (Japan). For. Div.
T. Kazama.
Misc Rep Yamashina Inst Ornithol 6(4), p 389-398, 1971.

Descriptors: *Oil pollution, Water birds, Water pollution effects, Oil spills.
Identifiers: Aethia-psittaculus, Brachyramphus-marmoratus, Calonectris-leucomelas, Cerorhinca-monocerata, Destruction, Gavia-artica, Gavia-stellata, *Japan Sea, Larus-argentatus, Lunda-cirrhata, Rissa-tridactyla, Synthliboramphus-antiquus, Uria-lomvia, *Sea birds.

A number of sea birds dead as a result of oil pollution had been found on the beach of Kashiwazaki, Niigata prefecture (Japan) since 1959. The dead birds included S. antiquus, Uria lomvia, Brachyramphus marmoratus, Cerorhinca monocerata, Lunda cirrhata, Aethia psittaculus, Rissa tridactyla, Larus argentatus, Calonectris leucomelas, Gavia stellata and Gavia arctica. Alcids were especially affected by the pollution and the ancient auklet, S. antiguus, was the most usual species. Thirty examples of the auklet were selected for anatomical analysis. They were grouped into 3 categories with respect to body weight and amount of fat and oil attached. The most severely polluted example had an oil weight comprising 50% of the body weight; it had the least fat. Other birds still had some fat. The oil was found even in the digestive tract. Ship oil was being cast offshore in the Japan Sea and was drifting ashore by prevailing winds.--Copyright 1976, Biological Abstracts, Inc.
W76-11562

CONTAMINATION OF THE SEA, (IN SPANISH),
J. Noguera Talar.
Inmersion Cienc 8/9, p 43-46, 1975.

Descriptors: *Sea basses, Fish, Water pollution. Identifiers: Croaker, Gilthead, Sea-slug, *Spain, Vegetation, Sheep's head(Fish), *Noise pollution(Water).

The disappearance of fish (sheep's head, gilthead, croaker, seabass, etc.) from shores (Spain) that formerly abounded in these species, was probably caused by the intrusion of man rather than pollution. Pollution may be responsible for the loss of ocean bottom vegetation and such fish food as sea slugs, but illicit dragnetting operations, underwater drilling for petroleum and especially the noise made by motor boats are more destructive. Noise is probably one of the prime factors in driving away fish from certain spots. In areas not recently disturbed by man, an abundance of fish is found.--Copyright 1976, Biological Abstracts, Inc.
W76-11564

DETOXICATION IN PLANTS OF TOXIC SUBSTANCES FROM INDUSTRIAL SEWAGE USED FOR IRRIGATION, (IN RUSSIAN),
Central Research Station Agricultural Use Sewage, Noginsk (USSR).
S. I. Khramova, and K. S. Bokarev.
Fiziol Rast 20(6), p 1257-1260, 1973.

Descriptors: *Water reuse, Aromatic compounds, Sewage, Industrial wastes, Organic compounds, *Toxicity, Irrigation, Carrots, Corn(Field), Grasses, Effluents.
Identifiers: *Aromatic hydrocarbons, *Detoxification(Plants).

Dynamics of the content of aromatic hydrocarbons in soil and in maize, grass and carrot were studied during irrigation with chemical industry sewage. These compounds were detected in the plants 1-5 days after irrigation, varying according to plant species. Decomposition of these toxic compounds in soil is rather slow--about 10 days after irrigation. The plants are suggested for detoxification of organic contaminants in industrial sewage.--Copyright 1976, Biological Abstracrs, Inc.
W76-11567

POLLUTION IN THE EFFLUENTS OF BRACCIANO LAKE AND IN ARRONE STREAM, ON THE BASIS OF THE DISTRIBUTION OF SIMULIIDAE, CHIRONOMIDAE, CULCIDAE AND OTHER DIPTERA, (IN ITALIAN),
Istituto Superiore di Sanita, Rome. (Italy). Laboratori di Parassitologa.
For primary bibliographic entry see Field 5B.
W76-11570

PETROLEUM-OXIDIZING BACTERIA ACCOMPANYING HIGHER AQUATIC PLANTS, (IN RUSSIAN),
N. V. Morozov.
Biol Nauk 17(6), p 94-98, 1974.

Descriptors: *Bacteria, *Aquatic plants, Pseudomonas, Organic compounds, Oil pollution, Plant physiology, *Bulrushes, *Cattails.
Identifiers: Bacillus, Bacteria, Bacterium, Micrococcus, Planosarcina, Sarcina, Scirpus-lacustris, Typha-angustifolia, *Petroleum-oxidizing bacteria.

The species composition of hydrocarbonoxidizing bacteria accompanying the bulrush (Scirpus lacustris) and narrowleaf cattail (Typha angustifolia), which are plants most resistant to high concentrations of petroleum (pollutant), was investigated. The bacteria (32 strains), found in experiments with and without the plants, belonged to the genera Bacillus, Bacterium, Pseudomonas, Micrococcus, Sarcina and Planosarcina. The bacteria accompanying the plants differed in species composition and in the ability to utilize various petroleum hydrocarbons as the sole C source.--Copyright 1976, Biological Abstracts, Inc.
W76-11572

EFFECTS OF ENRICHED DIET WITH IRON IN CULTURE OF YELLOW-TAIL, (IN JAPANESE),
Tokyo Univ. of Fisheries (Japan). Radioisotope Research Lab.
Y. Ikeda, H. Ozaki, and K. Uematsu.
J Tokyo Univ Fish 59(2), p 91-99, 1973.

Descriptors: *Fish diets, *Iron, Proteins, Water pollution effects, Absorption.
Identifiers: Anemia, Erythrocyte, Seriola-quinqueradiata, *Yellow-tail.

The effects of Fe on anemia in yellow-tail (Seriola quinquera-diata) fed on raw fish were studied. The decreasing orders of body weight, erythrocyte count, Hb level, color index and serum protein level after feeding for about 4 mo. were: raw fish > 57.3mg% added Fe > 7.3mg% added Fe.> Although decreasing orders of liver, kidney, spleen, and heart weight were 7.3mg% added Fe > 57.3mg% added Fe > raw fish, the effects of Fe enrichment were observed on the digestive organs. Serum Fe level was highest in a diet with 57.3mg% of Fe, and lowest in 7.3mg% of Fe. Absorption of 59 Fe was highest with 7.3mg% Fe and lowest with 57.3mg%. A diet enriched with Fe revealed almost the same Price-Jones curve as that of fish fed on raw fish.--Copyright 1976, Biological Abstracts, Inc.
W76-11573

THE MACROPHYTIC VEGETATION OF RUNNING WATERS IN SOUTH LOWER SAXONY AND THEIR RELATIONS TO WATER POLLUTION, (IN GERMAN),
H-J. Grube.
Arch Hydrobiol Supplementb 45(4), p 376-456, 1975.

Descriptors: Vegetation, Rivers, Streams, Distribution, *Phosphates, *Ammonium, Europe, Soils, Silage, Water pollution.
Identifiers: Callitriche-hamulata, Callitriche-platycarpa, Nasturtium-officinale, Sium-erectum, West Germany(Saxony), *Macrophytes.

The submerged macrophytic vegetation of the rivers and rivulets in South Lower Saxony (West Germany) is described and grouped into 3 communities with different demands on hydrochemical properties, soils and velocity of flow. The distribution of macrophytes shows some correlation with the degree of pollution, especially the NH4 concentration. The reactions of Sium erectum, Nasturtium officinale, Callitriche platycarpa and C. hamulata to different concentrations of NH4, phosphate, dung water and sewage of ensiled beet layers as typical pollutants of the area were tested in aquarium experiments.--Copyright 1976, Biological Abstracts, Inc.
W76-11574

PHYSICO-CHEMICAL PARAMETERS OF THE HYDROGRAPHIC SYSTEM OF LAKE NANTUA: RELATION WITH OSCILLATORIA, (IN FRENCH),
Station d'Hydrobiologie Continentale, Thonon-les-Bains (France).
J. Feuillade, and A. Orand.
Ann Hydrobiol 5(2), p 95-120, 1974.

Descriptors: Algae, Effluents, Lakes, Water pollution, Sewage, Phosphorus, Nitrates, Light, Physicochemical properties.
Identifiers: *France(Lake Nantua), *Oscillatoria.

Hydrological, meteorological and physico-chemical variations were studied in the influent and effluent of Lake Nantua (France). This work started in May 1969 and was completed in May 1972. After this date half the sewage was diverted from the rivers and conducted to the treatment plant below the lake. The data were converted into the weight of an element carried per second. The study pointed out the existence of sub-lacustrine springs. A decrease was observed in the amount of total P input since 1970 (before the building of the sewage pipes). P enrichment of waters by the town is evident, but NO3 is naturally present in these waters. Factorial analysis of correspondances shows that sunlight duration is the main variable controlling the number of algae in the lake.--Copyright 1976, Biological Abstracts, Inc.
W76-11575

PRIMARY PRODUCTION AND BIOTIC BALANCE OF PLANKTON IN THE NORTHEASTERN PART OF THE AMUR BAY, (IN RUSSIAN),
Akademiya Nauk SSSR, Vladivostok. Institut Morskogo Biologii.
I. F. Rassashko.
Okeanologiya. 14(4), p 693-698, 1974.

Descriptors: *Primary productivity, Bays, Respiration, *Phytoplankton, Chlorophyll, Seasonal.
Identifiers: *USSR(Amur Bay), *Biotic balance.

The waters of the NE part of the Amur Bay (USSR) are highly productive. The maximum phytoplankton primary production was about 1000 mgC.M-3/day at a near-shore station and 810 mgC.mg-3/day at a central station. Extremely high assimilation numbers from 57.2-162.0 mgC. mg chlorophyll-1 h were recorded. Primary production is in excess of plankton losses for respiration; the biotic balance of plankton is positive. During 1 yr, primary production varied considerably with minimum in winter and a maximum at the end of summer and in autumn. The differences between the seasons are statistically reliable. A close correlation (R = +0.85) was found between primary production at the surface (X) and below 1 m (Y). The relationship between these 2 values is expressed by the equation y = 1.71 + 3.1 x.--Copyright 1975, Biological Abstracts, Inc.
W76-11576

RELATION BETWEEN GENERATION TIME AND BIOMASS OF PHYTOPLANKTON, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Hydrobiology.
V. D. Fedorov, T. A. Dauba, and T. I. Kol'tsova.
Biol Nauki. 17(5), p 128-136, 1974.

Descriptors: *Biomass, *Phytoplankton, *Cytological studies, Equations.
Identifiers: *USSR(White Sea).

Seasonal variation of the rate of cell division of phytoplankton and the relation between the average values of the generation time found and the average volume of the cells of the individual species were studied. Data on the change of the abundance of individual populations in factorial enrichment experiments set were used for determining generation times. Histograms of the values of the seasonal rates of cell division and the calculated average values of the generation time are given for 28 spp. of phytoplankton of the White Sea (USSR). An equation is given for expressing the relation between the generation time and biomass of phytoplankton.--Copyright 1975, Biological Abstracts, Inc.
W76-11577

THE EFFECTS OF NTA ON THE GROWTH OF PHYTOPLANKTON WITH PARTICULAR CONSIDERATION GIVEN TO IRON AS A MICROELEMENT,
Eidgenoessische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewaesserschutz, Zurich (Switzerland).
H. Buergi.
Schweiz Z Hydrol. 36(1), p 1-70, 1974.

Descriptors: *Nitrilotriacetic acid, *Iron, *Growth rates, *Phytoplankton, Photosynthesis, Metals, Eutrophication, Lakes, Effluents, Mesotrophy, Water pollution effects, Acids, Trace elements.
Identifiers: Acetic acid, *Switzerland(Lake Lucerne), Switzerland(Greifensee).

While nitrilotriacetic acid (NTA) or Fe may stimulate phytoplankton photosynthesis on a short-term basis in mesotrophic Lake Lucerne (Switzerland), they impede this process in the eutrophic Greifensee. After a few days this reaction tapers off. It is highly unlikely that Fe acts as a growth-limiting factor; the Fe which inevitably gets into lakes through wastewater treatment plant effluents as a result of tertiary treatment (precipitation with Fe3+) will not have a long-term stimulating effect on plankton production. Both Fe-through adsorption-and NTA-through chelation-reduce the supply of free ions of various metals, especially Cu. Since these free ions are needed for plankton growth, and yet have a toxic effect even in small quantities (micro g/1), the medium can, through addition of Fe or NTA, be detoxified or the trace metals limited, with corresponding increase or curtailment of algal production. The different patterns for the 2 lakes can be explained by the influence of natural organic materials on the free ions.--Copyright 1975, Biological Abstracts, Inc.
W76-11578

EFFECT OF TREATED SEWAGE EFFLUENTS ON PHYTOPLANKTON IN LAKES, (IN GERMAN),
Eidgenoessische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewaesserschutz, Zurich (Switzerland).
P. Bossard, and H. Ambuehl.
Schweiz Z Hydrol. 36(1), p 187-200, 1974.

Descriptors: Water pollution effects, *Sewage effluents, Lakes, *Phytoplankton, *Algae, *Growth rates, Phosphorus, Nitrogen, Iron, Bioassay.

The effect of domestic sewage effluents after mechanical, mechanical-biological and mechanical-biological-chemical treatment on algal cultures and on natural lake phytoplankton was studied by means of laboratory assays and in situ experiments. The concentrations of P and N are almost exclusively responsible for any algal growth. Other constituents which may be present in sewage effluents (e.g.), residual amounts of Fe originating from the tertiary treatment) do not substantially stimulate the growth of algae.--Copyright 1975, Biological Abstracts, Inc.
W76-11579

BIOLOGICAL-PRODUCTIVE INVESTIGATIONS OF ZOOPLANKTON IN THE LAKES AND WATER RESERVOIRS OF THE USSR (GENERAL RESULTS OF THE INTERNATIONAL BIOLOGICAL PROGRAM), (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheski Institut.
For primary bibliographic entry see Field 2H.
W76-11581

ABSORPTION AND ACCUMULATION OF PESTICIDES RESIDUES AND CHLORINATED BIPHENYLS IN BOTH WILD AQUATIC VEGETATION AND RICE IN THE CAMARGUE REGION, (IN FRENCH),
Centre National de la Recherche Scientifique, Arles (France). Centre Ecologie Camargue.
A. Vaquer.
Oecol Plant 8(4), p 353-365, 1973.

Descriptors: *Pesticide residues, *Absorption, Algae, *Polychlorinated biphenyls, Deltas, Rice, *DDT, Plant physiology, *Bioindicators, Water pollution, Vegetation.
Identifiers: *France(Rhone delta).

The residues from certain chemicals (pesticides and polychlorinated biphenyls (PCB's) present in relatively small quantities in the various aquatic habitats in the Camargue region (Rhone delta),

France, were investigated in some aquatic and semi-aquatic plant species, including rice. These plants absorb and concentrate the products (alpha- and gamma- BHC, DDT and PCB's) to levels of 16-20,000 times (dry weight) that of water, varying with the species. The products absorbed are not spread homogeneously throughout the plant but are generally stored at higher levels in the leaves than in the roots and at the base of the stem. The concentrations in the fruit are higher than in the plant itself. Specific differences in concentrations are due to differences in stage of development, absorbing qualities and metabolic activity, particularly degradation. Because of their high accumulating capacity, algae seem to be good indicators of the degree of water pollution.--Copyright 1976, Biological Abstracts, Inc.
W76-11582

SUPERSHRIMP: DEEP BIOTURBATION IN THE STRAIT OF CANSO, NOVA SCOTIA,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
G. S. Pemberton, M. J. Risk, and D. E. Buckley.
Science, Vol. 192, No. 4241, 21 May 1976, p. 790-791. 2 fig., 5 ref.

Descriptors: Marine animals, *Sediments, *Benthos, *Crustacean, *Oil pollution, *Habitat improvement, Pulp wastes, Industrial wastes, Habitats, Sediment-water Interface, Organic wastes, *Canada, *Shrimp.
Identifiers: *Axius serratus, *Mud shrimp, Burrowing shrimp, *Strait of Canso(NS).

Axius serratus, a crustacean thought to be extremely rare, was discovered in large numbers in polluted regions of the Strait of Canso. The shrimp may live deeper than 3 meters in the sediment; burrows are kept open to at least 2.5 meters. Sediment contained in old filled burrows is anomalous in its distribution of particle size and its content of water, organic carbon, and trace elements. These anomalous qualities affect the geotechnical properties of sediments on the sea floor. (Katz)
W76-11584

LIPID COMPOSITION OF SURFACE FILMS, AND ZOOPLANKTON FROM THE EASTERN MEDITERRANEAN,
Institute of Oceanographic Sciences, Wormley (England).
For primary bibliographic entry see Field 5B.
W76-11585

ECOTOXICOLOGY OF CRUDE OILS AND THE USE OF EXPERIMENTAL MARINE ECOSYSTEMS,
Museum National d'Histoire Naturelle, Paris (France). Laboratoire de Physiologie Generale et Comparee.
J. C. Lacaze.
Marine Pollution Bulletin, Vol. 5, No. 10, 1974, p. 153-156, 3 fig., 4 ref.

Descriptors: *Ecology, *Toxicity, *Bioassay, *Methodology, *Ecosystem, *Laboratory system, *Laboratory tests, *Oil, Oily water, *Oil pollution, Water pollution, Water temperature, Primary productivity, Pollutant identification.
Identifiers: *Crude oil, *Kuwait crude, Controlled ecosystem.

Ecotoxicological investigations are generally undertaken in the laboratory on some constituents of ecosystems. The complementary synthetic aspect, comprising the analysis of the overall effect of a pollutant on an ecosystem, also falls within the framework of the science of pollution. Study of the effects of a crude Kuwait oil on the primary production of experimental ecosystems is described. (Katz)
W76-11586

ORGANIC POLLUTION IN ENSENADA BAY, MEXICO,
Centre d' Oceanographie, Marseille (France). Station Marine d'Endoume.
For primary bibliographic entry see Field 5B.
W76-11587

REDUCTION OF FIELD POPULATIONS OF FIDDLER CRABS BY UPTAKE OF CHLORINATED HYDROCARBONS,
Marine Biological Lab., Woods Hole, Mass Boston Univ. Marine Program.
C. T. Krebs, I. Valiela, G. R. Harvey, and J. M. Teal.
Marine Pollution Bulletin, Vol. 5, No. 9, 1974, p. 140-142, 3 tab., 24 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Polchlorinated biphenyl, *DDE, *Sewage sludge, *Bioassay, *Crabs, Behavior, *Aldrin, *Dieldrin, Crustaceans, Fertilzers, *Massachusetts, Marshes, *Salt marshes.
Identifiers: *Great Sippewissett marsh(Mass), West falmouth(Mass), Fiddler Crabs, Uca pugnax.

Fiddler crabs are particularly sensitive to chlorinated hydrocarbons. Crabs that have been feeding on contaminated material show an impairment of their escape reaction. High concentrations of Aldrin and Dieldrin in plots of marsh experimentally treated with contaminated sewage sludge indicate that these insecticides are responsible for a drastic reduction in fiddler crab populations. (Katz)
W76-11588

ANTIMICROBIAL-RESISTANT COLIFORMS IN NEW YORK BIGHT,
Montclair State Coll., Upper Monclair, N. J. Dept. of Biology.
L. K. Koditschek, and P. Guyre.
Marine Pollution Bulletin, Vol. 5, No. 5, 1974, p. 71-74, 1 tab., 1 fig., 23 ref.

Descriptors: Water pollution effects, *Marine bacteria, *Marine microorganisms, *Sewage bacteria, *Sewage pollution, *Coliforms, *Enteric bacteria, *Sewage sluge, *Heavy metals, Atlantic Ocean, Public health, Sediments, Sludge disposal, New York.
Identifiers: *New York Bight, Antimicrobial-resistant coliforms, Heavy metal resistant coliforms, Antibiotic resistance.

A preliminary study of sediments and overlying water samples obtained at the approximate center of the sewage sludge bed in the New York Bight, revealed significant numbers of coliforms resistant to antibiotics and heavy metals. Some of the isolates were shown to transfer antibiotic resistance during conjugation with a recipient strain of Salmonella gallinarum. The selection of bacterial populations resistant to antimicrobials may be significant in the ecology of this improverished area, and requires further study. (Katz)
W76-11590

EFFECTS OF CRUDE OIL AND DISPERSANTS ON BI-VALVES,
American Univ., Beirut (Lebanon). Dept. of Biology.
R. J. Avolizi, and M. Nuwayhid.
Marine Pollution Bulletin, Vol. 5, No. 10, p. 149-153, 1974. 1 tab., 2 fig., 30 ref.

Descriptors: Oil, *Oil pollution, *Oily water, *Toxicity, *Bioassay, Methodology, *Respiration, Mortality, *Mollusks, Mussel, Waste water disposal, Detergents, Laboratory analysis.
Identifiers: *Crude oil, *Dispersants, *Corexit 7664, Sub-lethal concentration, Respiration rate, *Arabian crude oil.

The toxic effects of crude oil, the dispersant Corexit 7664, and mixtures of these on the respiration and mortality of two species of bivalve have been examined. A light Arabian crude is most toxic to one, Corexit is most toxic to the other. The susceptibility to oil of the mussel Brachidontes is also reflected in a significant depression of respiration rate at sub-lethal concentrations. (Katz)
W76-11591

TOXICITY OF OIL-SINKING AGENTS,
Ministry of Agriculture, Fisheries and Food, Burnham-on-Crouch (England). Fisheries Lab.
R. A. R. Blackman.
Marine Pollution Bulletin, Vol. 5, No. 8, 1974. p. 116-118. 1 tab., 2 fig., 5 ref.

Descriptors: *Oil pollution, *Oily waters, *Toxicity, *Bioassay, *Morality, *Shrimp, *Oil spills, *Organic compounds, Disaster, Waste water disposal, Marine animals.
Identifiers: Wetting agents, Ethylene glycol, Armac T, Solvents, Isopropyl alcohol, Geramin TA200A, 2-Butoxy ethanol, 50% mortality, Marine pollution.

It may be necessary to immobilize an oil spill of more than 10,000 tons in European waters by sinking with sand. The possibility of damage to marine organisms from the sinking agents used has been investigated and it is concluded that toxic effects are unlikely to result. (Katz)
W76-11592

FLUORIDE IN MARINE ANIMALS,
Newcastle-upon-Tyne Univ. (England). Dept. of Plant Biology.
D. A. Wright, and A. W. Davison.
Marine Pollution Bulletin, Vol. 5, No. 8, 1974. pp. 119-121, 3 tab., 11 ref.

Descriptors: *Fluorides, *Marine animals, *Industrial effluents, Birds, Fish, *Invertebrates, *Food chains, Commercial fish, *Shrimps, Water pollution, Aluminum, Path of pollutants, Public health.
Identifiers: Cod, Haddock, Aluminum smelter, Tissue concentration, Flounders, Spratt, Northumberland coast.

Fluoride in a greatly diluted form is part of the effluent from an aluminum smelter on the Northumberland coast in north-east England. Fluoride is concentrated in the skeleton of birds, fish and invertebrates and to a smaller extent in the skin of fish. All concentrations found both in the seawater and in local animals are within the normal range and it is unlikely that the additions from the smelter materially affect the situation. Since fluoride concentrates in inedible tissues there appears to be little health risk from this source in seafood. (Katz)
W76-11593

MIDSUMMER METABOLISM OF AN EEL-GRASS COMMUNITY,
Georgia Univ., Athens. Dept. of Botany.
J. R. Suda.
Marine Pollution Bulletin, Vol. 5, No. 10, 1974, p. 156-159, 1 tab., 3 fig., 7 ref.

Descriptors: *Intertidal areas, *Littoral, *Shoreline cover, *Rooted aquatic plants, *Metabolism, *Succession, *Respiration, Beaches, Aquatic environment, Aquatic plants, *New York, *Halophytes, Submerged plants, Growth stages, Photosynthesis, Physiological ecology.
Identifiers: *Zostera, *Eel grass, *Long Island(NY), Eelgrass community metabolism, Eelgrass community organisms, Great South Bay.

Eelgrass (Zostera marina) is the dominant member of an important intertidal ecosystem found in many parts of the world. In this preliminary study the metabolism of the entire eelgrass community,

including epiphytic plants and other organisms, has been measured in Great South Bay on Long Island, New York. In July it is in equilibrium and consumes as much oxygen as it produces, but in August both photosynthesis and respiration are reduced, with a net increase in oxygen production. This is due largely to the rapid growth of epiphytes during that month. (Katz)
W76-11594

FISH CULTURE IN WARMED WATERS IN THE CZECHOSLOVAK SOCIALIST REPUBLIC (CHOV RYB V OTEPLENYCH VODACH V CESKOSLOVENSKE SOCIALISTICKE REPUBLICE),
Vyzkumny Ustav Rybarsky a Hydro-biologicky, Vodnany (Czechoslovakia).
V. Krupauer.
Bulletin VURH, Fisheries Research Institute, Vodnany, Vol. XI, No. 4, p. 3-6, 1975, 5 ref.

Descriptors: *Aquiculture, Commercial fish, *Heated waters, *Growth rates, *Fish farming, *Nuclear powerplants, *Thermal water, *Fish reproduction, *Carp, Nuclear energy, *Thermal pollution, Temperature, Water pollution effects, Thermal stress.
Identifiers: *Czechoslovakia.

The possibilities of fish culture in warmed waters are discussed with mention made of the use in Czechoslovakia of waters warmed by nuclear power stations. These waters are designed to be used for the control of spawning in economically important fishes through a transient breeding of parent material in warmed water, for early fry rearing in this environment, and for carp fry rearing to the age of one year in order to produce stock fish capable of reducing the time required to reach market weight to two years. (Katz)
W76-11595

A COMPARISON OF THE ABUNDANCE AND DIVERSITY OF FOSSIL PIGMENTS IN WETLAND PEATS AND WOODLAND HUMUS LAYERS,
Ohio Wesleyan Univ., Delaware. Dept. of Botany and Bacteriology.
J. E. Sanger, and E. Gorham.
Ecology. 54(3), p 605-611, 1973.

Descriptors: *Chlorophyll, *Humus, Lakes, Wetlands, *Pigments, Peat, Mosses, Bogs, Swamps, Lake sediments, Bioindicators, Decomposing organic matter.
Identifiers: *Carotenoids, Woodland humus layers, Fossil pigments.

The abundance and diversity of fossil pigments (chlorophyll derivatives and carotenoids) in woodland humus layers and in circumneutral to moderately acid swamp peats were shown to increase with degree of soil waterlogging. The swamp peats are distinctly richer in pigments than are the highly acid peats from a Sphagnum bog, especially as regards carotenoids. However, the bog and swamp peats exhibit equal pigment diversity. Although the semi-aquatic swamp peats are richer and more diverse in fossil pigments than terrestrial humus layers, they are much poorer and much less diverse than profundal lake sediments. A combination of low pigment concentrations, moderate pigment diversity, and high ratios of chlorophyll derivatives to carotenoids was useful as an indicator of swamp invasion in the course of lacustrine evolution.--Copyright 1973, Biological Abstracts, Inc.
W76-11601

YIELD AND HEAVY METAL CONTENT OF FOOD CROPS GROWN ON SOILS AMENDED WITH SEWAGE SLUDGE,
California Univ., Riverside.
For primary bibliographic entry see Field 5D.
W76-11610

FINE PARTICLES AND WATER QUALITY IN THE COASTAL MARINE ENVIRONMENT,
State Univ. of New York at Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 5B.
W76-11612

OBSERVATIONS ON THE CESTODE EUBOTHRIUM SALVELINI IN JUVENILE SOCKEYE SALMON (ONCORHYNCHUS NERKA) AT BABINE LAKE, BRITISH COLUMBIA,
Fisheries and Marine Service, Nanaimo (British Columbia). Biological Station.
H. D. Smith.
J Fish Res Board Can. 30(7), p 947-964, 1973.

Descriptors: *Sockeye salmon, Lakes, *Canada, *Smolt, Plankton, *Fish diseases, *Fish parasites, Fish growth, Fish behavior, Zooplankton.
Identifiers: Cestode, Eubothrium-salvelin, Oncorhynchus-nerka, *Babine Lake(BC).

Infection incedence among 15 brood years of smolts in the period 1952-71 was estimated from smolt and underyearling samples, and among late run fish from the main part of Babine Lake (Canada) ranged from 6-45% (average 26%). In early run fish from the North Arm-Nilkitkwa area it ranged from 5-46% (average 22%) in 10 yr during 1958-71. Infection intensity changed substantially during 1967; but about 1 fish in 8 or 200,000 individuals in the early run, carried parasite loads greater than or equal to 10% of fish weight. Mature E. salvelini (Schrank 1790) averaged 32 mg in weight and 34 mm in length during a period of high incidence and intensity of infection 1967. Although no proof was found of direct mortality caused E. salvelini, indirect effects such as inferior growth, poor swimming performance, or aberrant behavior due to large cestode loads may increase host susceptibility to death from other causes. Changes in relative abundance of the zooplankton intermediate host, and midsummer shifts in feeding preferences of young sockeye likely account for increasing infection incidence in June and July, and stable incidence thereafter.--Copyright 1973, Biological Abstracts, Inc.
W76-11624

5D. Waste Treatment Processes

FRAGIPAN STABILITY IN SOIL-PLANT EFFLUENT DISPOSAL SYSTEMS,
Missouri Univ., Columbia. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W76-11104

CONTINUED STUDIES (PHASE II) IN THE SEARCH FOR A PREDICTIVE MODEL FOR SLUDGE CHARACTERIZATION USEFUL TO DESIGN AND CONTROL OF SLUDGE DEWATERING PROCESSES IN WATER RECYCLE SYSTEMS,
Maine Univ., Orono. Land and Water Resources Inst.
E. G. Bobalek, R. E. Durst, B. Yadeta, and B. A. Cook.
Available from the National Technical Information Service, Springfield, Va., 22161, as PB-256 237, $5.00 in paper copy, $3.00 in microfiche. Report No. 5-75, June 1975. 76 p, 11 fig, 15 tab, 12 ref, 3 append. OWRT B-009-ME(1). 14-01-0001-4089.

Descriptors: *Sludge treatment, *Sewage sludge, *Dewatering, Model studies, Filtration, *Kinetics, Recycling, Waste water treatment, Waste treatment, Waste identification, Correlation analysis.
Identifiers: *Sludge dewatering, Sludge handling, Dewatering model, Sludge aging.

Phase II of continuing studies to develop a predictive model for sludge characterizations was directed toward: (I) Exploring the value of the model that relates filterability to one static chemical parameter (the bound water) for complex sludges; and (II) Replacing the exacting and tedious experimental methods developed earlier for data retrieval with more convenient procedures. The goal of greater experimental convenience was achieved by (A) Replacing the laboratory filter cell system with a pilot plant scale rotary filter; and (B) Replacing the vapor pressure isotherm method for bound water measurement with a convenient instrumental method that senses relative humidity over a single sample of progressively-dried sludge cake. The goal of extending or improving the original quantitative model to make filterability predictions was frustrated when physicochemical aging effects of the complex sludges were observed. It became apparent that detailed knowledge of how hydrodynamic parameters depend upon sludge chemistry was necessary. Thus the original correlation model which ignores aging kinetics was found to be too simple for general use. However, a new laboratory method was developed which can track short and long term kinetics for most sludges provided proper sampling is conducted. (See also W74-10528) (Hutchins-Maine)
W76-11116

MUNICIPAL WASTES AS A FERTILIZER SOURCE,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
J. R. Gilley.
Available from NTIS Springfield, Va., 22161, as PB-256 206, $3.50 in paper copy, $3.00 in microfiche. Journal Series Paper No. 5042, University of Nebraska Agricultural Experiment Station, presented at 1976 Sprinkler Irrigation Association Technical Conference in Kansas City, February 24, 1976. (1976). 14 p, 2 fig, 4 tab, 14 ref. OWRT A-041-NEB(1). 14-34-0006-6028.

Descriptors: *Municipal wastes, Sludge, Effluents, Fertilizers, *Organic wastes, Land management, Application rates, Crop production.
Identifiers: *Land application.

Municipal sewage wastes, sludges and effluents can be used on land for crop production with benefits for both agricultural and urban interests, but the waste and the land must be carefully managed to achieve favorable results. Successful land utilization of municipal wastes for crop production requires the usual basic soils, climate and crop information. However, because of the nature of the material being placed on the land and public reaction to it, soil-plant management information becomes even more important. The objective in many waste application systems is to maximize waste application to the land while preventing environmental contamination and in addition to produce an acceptable crop yield. Accomplishing this often requires considerable adjustments from the usual crop and soil management practices. Organic wastes can be used safely and effectively to increase soil productivity if proper precautions are taken concerning heavy metals, toxic chemicals, nitrate leaching, erosion losses and undesirable odors. When applied at crop use rates and with proper soil management, most municipal wastes present no serious environmental hazards and should be considered a resource that agriculture can very well use.
W76-11117

HYDRAULIC COLLECTION AND DISPOSAL OF REFUSE,
Meta Systems, Inc., Cambridge, Mass.
J. Kuhner, and P. M. Meier.
Journal of the Environmental Engineering Division, Proceedings of the American Society of Civil Engineers, Vol. 102, No. EE4, Proceedings paper 12296, p 769-788, August 1976. 4 fig, 5 tab, 21 ref.

Descriptors: *Solid wastes, *Systems analysis, *Sewage treatment, Simulation analysis, Mathematical models, Hydraulics, Sludge disposal, Management, *Waste water treatment.
Identifiers: *Cost effectiveness, Refuse, *Refuse disposal, Wet system.

A concept for residential refuse management is examined that calls for individual household refuse grinders, dilute slurry transport of ground refuse in the existing sanitary sewer system, and joint treatment of refuse and sewage at an expanded treatment facility that includes anaerobic digestion for methane generation. Hydraulic transport of ground refuse in existing sewer systems may be feasible only if both metals and glass are excluded, and a conventional collection of the nongrindable and bulky constituents of residential refuse will still be needed. The total 1973 cost of such a wet system is estimated at between $110 and $200 per household per year, of which $80-$105 is used for grinding. This compares to a total cost for sewage and refuse collection and disposal under existing concepts of $40-$115 per household per year. If the cost of the grinder is excluded (individuals would purchase grinders), the 1973 wet system costs to the public sector would be on the order of $30-$90. (Bell-Cornell)
W76-11138

ESTIMATES OF INDUSTRIAL WATERBORNE RESIDUALS CONTROL COSTS: A REVIEW OF CONCEPTS, METHODOLOGY, AND EMPIRICAL RESULTS,
Johns Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 5G.
W76-11160

REMOVAL OF ALGAE FROM WASTE STABILIZATION POND EFFLUENT,
Mississippi State Univ., Mississippi State Dept. of Civil Engineering.
M. T. Bond.
Available from the National Technical Information Service, Springfield, Va., 22161 as PB-256 512 $4.50 in paper copy, $3.00 in microfiche. Mississippi Water Resources Research Institute, Mississippi State, Completion Report July 1976. 56 p, 19 fig, 6 tab, 22 ref, 4 append. OWRT A-096-MISS(1).

Descriptors: Ponds, Lagoons, Waste treatment, *Algae, *Oxidation lagoons, Effluents, Sludge Polyelectrolytes, *Waste water treatment, Kinetics.
Identifiers: *Alum treatment.

The objectives were: (1) To determine the variances of selected parameters for waste stabilization pond effluents treated with alum alone and with alum used with polyelectrolytes and (2) To determine the sludge volume and characteristics produced in the physical-chemical process. In addition, the use of lime in place of alum was studied. Effluents were collected for four sampling conditions and treated in the laboratory to determine chemical requirements and sludge characteristics. Alum requirements were in the range of 60 to 100 mg/l while lime (Ca(OH)2) requirements varied from 250 to 600 mg/l. Various polyelectrolytes were tried and produced fair results when cationic polymers were used in concentrations greater than 15 mg/l. The results from chemical-polymer systems were only a little better than those using chemicals only. An equation has been proposed that relates alum sludge volume produced to suspended solids removed. The sludge was found to separate rapidly and to be thickened to a significant degree by gravity. Results of the traditional specific resistance to filtration and the filter leaf tests indicate that vacuum filtration of the sludge would not be effective. A possible exception may be precoat filtration of lime sludge.
W76-11171

INHIBITION OF NITRIFICATION BY AMMONIA AND NITROUS ACID,
Monteco Environmental Management Associates, Montgomery, N.Y.
A. C. Anthonisen, R. C. Loehr, T. B. S. Prakasam, and E. G. Srinath.
Journal Water Pollution Control Federation, Vol. 48, No. 5, p 835-852, May, 1976. 15 fig, 4 tab, 24 ref.

Descriptors: *Nitrification, *Inhibitors, *Inhibition, *Ammonia, *Nitrogen fixing bacteria, Waste treatment, Temperature, Microorganisms, Municipal wastes, Industrial wastes, Farm wastes, Soils, Fertilizers, Chemical reactions, *Waste water treatment, Nitrites.
Identifiers: *Nitrous acid, Nitrifiers.

The inhibitory effects of ammonia and nitrous acid on nitrification, a process which may occur during waste treatment, were investigated. Nitrification inhibition was correlated with free ammonia and free nitrous acid concentrations but not with total ammonia or nitrite ion concentrations. The free ammonia concentrations required for the inhibition of nitrosomonads and nitrobacters were 10-150 mg/liter and 0.1-1.0 mg/liter, respectively. Inhibition of nitrifying organisms by free nitrous acid was initiated at concentrations between 0.22 and 2.8 mg/liter. Factors affecting the inhibition of nitrification by free ammonia and free nitrous acid included acclimation of the nitrifiers to the inhibitors, temperature, and the number of active nitrifying organisms. Free ammonia and free nitrous acid inhibition of nitrification occurs in municipal, industrial, and agricultural wastes as well as with fertilizers in the soil. (Kreager-FIRL)
W76-11197

AWT ENERGY NEEDS A PRIME CONCERN,
Orange County Water District, Fountain Valley, Calif. Board of Directors.
D. G. Argo, and G. M. Wesner.
Water and Wastes Engineering, Vol. 13, No. 5, p 24-26, 77, May, 1976. 2 fig, 1 tab.

Descriptors: *Waste water treatment, *Tertiary treatment, *Treatment facilities, *Energy budget, Adsorption, Filtration, Chlorination, Pumps, Equipment, Reverse osmosis, Facilities, Recycling, *Treatment facilities, Desalination.

Primary and secondary energy requirements are outlined for an advanced design waste water treatment plant designed to treat 15 million gallons/day of trickling filtered secondary effluent by chemical clarification with lime, ammonia stripping, recarbonation, mix-media, filtration, carbon adsorption, and chlorination. Energy consumptions for the influent pump station, the chemical clarification system, ammonia removal towers, the recarbonation basin, the filtration system, activated carbon adsorption, and chlorination are 2688, 842, 27,988, 4370, 412, 3566, and 91 kilowatt-hours/day, respectively. A reverse osmosis system is being installed to demineralize one-third of the plant's flow and is expected to consume about 35,000 kilowatt-hours/day. Detailed diagrams of the reclamation plant and the reverse osmosis section are presented. (Kreager-FIRL)
W76-11198

THE SIGNIFICANCE OF PORE DIFFUSION TO FILTER DENITRIFICATION,
Technical Univ. of Denmark, Lyngby. Dept. of Sanitary Engineering.
P. Harremoes.
Journal Water Pollution Control Federation, Vol. 48, No. 2, p 377-388, February, 1976. 9 fig, 1 tab, 15 ref.

Descriptors: *Denitrification, *Filters, *Design criteria, *Mathematical models, *Kinetics, Waste treatment, Chemical reactions, Physical properties, Biological treatment, Pores, Diffusion, Waste water treatment, Filtration.
Identifiers: *Filter denitrification.

The kinetics of filter denitrification are reviewed, and a mathematical expression relating pore diffusion to filter denitrification is developed. An expression for a bulk half-order reaction based on zero-order heterogeneous reactions in a pore which is only partly penetrated by the substrate is found to be suitable for simulating filter denitrification. The applicability of the theory is demonstrated by a comparison with filter concentration profiles and with the half-order bulk reaction rate per unit filter surface. Values of the half-order bulk reaction rate ranging over 4 orders of magnitude are demonstrated for differences in media type and size, porosity, specific surface, residence time, scale of experiment, and temperature. The design of denitrification filters with respect to choice of media and residence time is shown possible by selection of the proper reaction rate. (Kreager-FIRL)
W76-11199

A FORCED AERATION SYSTEM FOR COMPOSTING WASTEWATER SLUDGE,
Agricultural Research Service, Beltsville, Md. Biological Waste Management; and Agricultural Research Service, Beltsville, Md. Soil Nitrogen Lab.
For primary bibliographic entry see Field 5E.
W76-11200

RESPONSE OF ACTIVATED SLUDGE TO QUANTITATIVE SHOCK LOADING,
Weston (Roy F.), Inc., Wilmette, Ill.
P. Krishnan, and A. F. Gaudy, Jr.
Journal Water Pollution Control Federation, Vol. 48, No. 5, p 906-919, May, 1976. 9 fig, 3 tab, 16 ref.

Descriptors: *Activated sludge, *Waste water treatment, *Feeding rates, Performance, Evaluation, Treatment facilities, Equipment, Treatment, Organic loading.
Identifiers: Quantitative shock loading, Substrate leakage.

The effect of quantitative shock loading, administered as a step increase in feed concentration, on both once-through and cell recycle activated sludge systems was investigated for various hydraulic reactor detention times. As the detention time was increased, there was generally an improvement in system response with regard to the amount of substrate leakage during the transient phase at a given shock concentration of substrate. This trend was most readily observed in the once-through systems, although it was also seen in the cell recycle systems at high shock levels. Cell recycle operation appeared to have some beneficial effect with regard to transient substrate leakage at the 3000 mg/liter level; however, a 5000 mg/liter shock level exceeded the ability of the cell recycle program to attenuate substrate leakage over that observed in the once-through system. The results indicate that activated sludge systems may be expected to accommodate a 200% increase in feed concentration with little or no substrate leakage in the transient phase. (Kreager-FIRL)
W76-11201

FOLKLORE IN THE DESIGN OF FINAL SETTLING TANKS,
Delaware Univ., Newark. Dept. of Civil Engineering.
R. I. Dick.
Journal Water Pollution Control Federation, Vol. 48, No. 4, p 633-644, April, 1976. 3 fig, 30 ref.

Descriptors: *Sedimentation, *Settling basins, *Activated sludge, *Waste water treatment, *Design criteria, Retention, Rates, Performance, Evaluation, Treatment facilities, Equipment, Flotation, Phosphorus, Settling velocity.
Identifiers: *Settling tanks.

Empirical parameters which have been found useful in the past for describing the performance of final settling tanks in activated sludge processes are evaluated in light of current knowledge on the subject. Stipulation of some maximum overflow rate and minimum retention time seems reasonable, but only for a description of the clarification function of the tank. These parameters completely disregard the thickening function of the tank. The use of sludge volume index as a basis for estimating the concentration of return sludge to be expected from a final settling tank appears questionable because it does not take into account the designer's and the operator's ability to alter the performance of final settling tanks to achieve a range of return sludge concentrations. The concept that solids retention time must be minimized in final sedimentation tanks does not seem well founded except as it relates to the possible flotation of sludge caused by denitrification and to the release of phosphorus from sludges. The popular idea that overflow rates in final sedimentation tanks should be selected to be equivalent to the settling velocity of the mixed liquor is theoretically incorrect and may result in inaccurate sedimentation tank design. (Kreager-FIRL)
W76-11202

ONE- VERSUS TWO-STATE NITRIFICATION IN THE ACTIVATED SLUDGE PROCESS,
Oklahoma State Univ., Stillwater. School of Civil Engineering.
E. L. Stover, and D. F. Kincannon.
Journal Water Pollution Control Federation, Vol. 48, No. 4, p 645-651, April, 1976. 6 fig, 17 ref.

Descriptors: *Nitrification, *Activated sludge, *Waste water treatment, *Kinetics, Sludge disposal, Costs, Alkalinity, Acids, Evaluation, Performance, Laboratory tests.
Identifiers: Nitric acid, Literature reviews.

A literature search and laboratory experiments were performed to evaluate the relative merits of one- versus two-stage nitrification in activated sludge processes. Both one- and two-stage systems were found capable of achieving complete nitrification and a high level of carbon removal. The operational difference between the two processes was simply the value of the limiting mean cell residence time or growth rate. The limiting mean cell residence time for complete nitrification was six days for the two-stage process and ten days for the one-stage process. The one-stage process appears to offer some advantages if sludge disposal presents a difficult or costly problem and only requires one clarifier. However, nitrification may be possible in a two-stage process when it is not possible in a one-stage system. A problem encountered in both the one- and two-stage processes is pH reduction by the production of nitric acid. If insufficient alkalinity is present in the waste water, the one-stage system and the nitrification reactor of the two-stage system will require pH adjustment. (Kreager-FIRL)
W76-11203

AEROBIC THERMOPHILIC TREATMENT OF HIGH STRENGTH WASTEWATERS,
Middle East Technical Univ., Ankara (Turkey). Dept. of Environmental Engineering.
G. A. Surucu, E. S. K. Chian, and R. S. Engelbrecht.
Journal Water Pollution Control Federation, Vol. 48, No. 4, p 669-679, April, 1976. 7 fig, 1 tab, 29 ref.

Descriptors: *Waste water treatment, *Aerobic treatment, *Thermophilic bacteria, *Organic compounds, Activated sludge, Chemical oxygen demand, Rates, Kinetics, Temperature, Respiration, Efficiencies, Performance, Feasibility.
Identifiers: *Aerobic thermophilic treatment.

The feasibility of using aerobic thermophilic treatment, a modification of the conventional activated sludge process, for purifying waste waters with high concentrations of organic matter was evaluated using a single-stage, isothermal, completely mixed, continuous-flow reaction system. The thermophilic system proved capable of treating waste water with a high organic content in less time than that required for mesophilic systems and produced less sludge. Over 90% removal of soluble chemical oxygen demand was observed with a sludge retention time of 2 days. The percentage removal of chemical oxygen demand increased with increasing sludge retention times. The theoretical air requirements for thermophilic systems are expected to be slightly higher (14%) than for mesophilic systems because of the higher rate of endogenous respiration at elevated temperatures. (Kreager-FIRL)
W76-11204

DEBATE GROWS OVER WATER PURIFICATION METHODS.
For primary bibliographic entry see Field 5F.
W76-11205

EQUIPMENT APPLICATIONS IN WASTEWATER TREATMENT CLARIFIERS,
FMC Corp., Itasca, Ill. Environmental Equipment Div.
J. C. Lodholz, and H. Pentz.
Public Works, Vol. 107, No. 6, p 97-100, June, 1976. 4 fig.

Descriptors: *Waste water treatment, *Treatment facilities, *Mechanical equipment, *Separation techniques, *Settling basins, Flotation, Sludge, Scum.
Identifiers: *Clarifiers.

Gravity separation in primary and secondary clarifiers is generally confined to settling tanks except where industrial wastes susceptible to flotation are present. The chain and flight collector, most commonly used in primary clarifiers, consists of two strands of chain carrying flights at about 10 ft intervals and removes both sludge and scum. Rectangular basins may also be equipped with a travelling bridge, which traverses the length of the basin and carries a scraper blade along the bottom to collect sludge and, on the return run, along the surface for skimming. Collection mechanism for circular tanks have rotating skimming blades for scum and rotating scraper blades for sludge. Primary sludge collectors with skimmers also require discharge devices, which may be operated manually or automatically, periodically or continuously. A stirring mechanism is required if flocculants are used; separate chambers or the same chamber may be used for mixing and flocculation. Tube settlers are used in advanced waste treatment; sludge normally leaves them by gravity. The frequency of sludge withdrawal and scum removal vary for different plants, but a schedule can be established for a particular plant. Mechanical parts of skimmers and sludge collectors should be checked regularly to determine whether maintenance is required. (Snyder-FIRL)
W76-11206

LAND TREATMENT OF MUNICIPAL WASTEWATER,
Metcalf and Eddy, Inc., Palo Alto, Calif.
R. W. Crites, and C. E. Pound.
Environmental Science and Technology, Vol. 10, No. 6, p 548-551, June, 1976. 1 fig, 2 tab, 6 ref.

Descriptors: *Waste water treatment, *Treatment facilities, *Land use, Effluents, Tertiary treatment, Costs, *Infiltration rates, Soils, Irrigation, Water quality, Water management(Applied), *Overland flow.
Identifiers: *Rapid infiltration.

Land treatment and advanced treatment of waste water are economically competitive in many cases and produce effluents of generally comparable quality. The three major types of land treatment, slow-rate, rapid infiltration, and overland flow, are compared. Land treatment removes organics, nitrogen, and some phosphorus, but exchangeable cations and trace elements can cause problems in some soils. In certain cases, municipal waste water should be treated before land application. For a given type of land treatment, the quality of the effluent that can be attained is nearly the same whether untreated, primary, or secondary waste water is applied. Bakersfield, California; Tallahassee, Florida; and San Angelo, Texas all use slow-rate land application to irrigate cropland. Rapid infiltration of waste water that has received secondary treatment is used in Lake George, New York, and Phoenix, Arizona. Overland flow of treated waste water is used in Ada, Oklahoma, and Melbourne, Australia. The costs of land treatment can compare favorably with those of conventional treatment and discharge systems. With proper management and monitoring, land treatment can compete with advanced waste water treatment in many locations in terms of renovated water quality and water and nutrient resource management. (Snyder-FIRL)
W76-11207

COMPARATIVE EFFECTS OF CHEMICAL PRETREATMENT ON CARBON ADSORPTION,
Municipal Environmental Research Laboratory. Cincinnati, Ohio.
J. J. Westrick, and J. M. Cohen.
Journal Water Pollution Control Federation, Vol. 48, No. 2, p 323-338, February, 1976. 18 fig, 4 tab, 18 ref.

Descriptors: *Waste water treatment, *Treatment facilities, *Adsorption, *Activated carbon, *Pilot plants, Filtration, Effluents, Phosphorus, Organic matter, Suspended solids, Pre-treatment(Water).
Identifiers: Physico-chemical treatment, *Chemical pre-treatment.

Three physico-chemical pilot plants were operated for a period of nearly 11 mo with three distinctly different chemical clarification schemes preceding identical granular activated carbon and filtration systems. All produced effluents with low concentrations of phosphorus, organics, and solids. A data analysis method was developed that permits simplistically comparing carbon dosages required for given effluent qualities. Superior organic removal was provided by the iron coagulant in clarification-filtration pretreatment, yielding the lowest estimated cost for a carbon system to produce any effluent quality studied. These estimates include only the carbon process, with regeneration, and exclude other total system costs. These results obviously are specific to the waste type and conditions of operation. Although small differences in performance were observed for the three systems, all produced effluents in essentially the same range of quality. (Snyder-FIRL)
W76-11209

THE EXTENSION OF THE SEWAGE-TREATMENT PLANTS OF STUTTGART (DER AUSBAU DER STUTTGARTER KLARWERKE).
W. Haydt.
Forum Umwelt Hygiene, Vol. 27, No. 5, p 167-173, 1976. 20 fig.

Descriptors: *Waste water treatment, *Sewage treatment, *Biological treatment, *Treatment facilities, *Biochemical oxygen demand, Sewerage, Europe, Sludge treatment.
Identifiers: Stuttgart(Germany).

The catchment area of the city of Stuttgart, Germany, covers 265 sq km. The central sewage treatment works and three smaller treatment plants in the suburbs needed enlargement due to new design criteria, improved storm water treatment, and environmental protection. In all these treatment plants the biological treatment and sludge treat-

ment were improved and enlarged in two sections. Total costs were approximately 50 million DM. In 1978, the effluent biochemical oxygen demand (BOD) should be below 20 mg BOD/liter. Some research investigations are being conducted utilizing tertiary treatment to produce an effluent BOD of 10 mg BOD/liter. (Snyder-FIRL)
W76-11210

SMOKE TEST SEWERS TO FERRET OUT ILLEGAL INFLOW,
For primary bibliographic entry see Field 8G.
W76-11211

INDUSTRIAL WASTES MEET DOMESTIC SEWAGE.
American City and County, Vol. 91, No. 6, p 71-72, June, 1976. 2 fig, 1 tab.

Descriptors: *Waste water treatment, *Industrial wastes, *Municipal wastes, *Aeration, Biological treatment, Oxidation lagoons, Biochemical oxygen demand, Odor, Foaming, Chlorination.

The construction of a combined secondary treatment plant to handle municipal primary wastes from the city of Grand Rapids, Michigan and industrial wastes from a paper mill is described. The treatment plant is an extended aeration type. Following primary treatment, overflow from the domestic and industrial primary clarifiers is combined and pumped to the secondary plant through a 36-inch force main. Two 'A' lagoons receive the primary effluent and waste activated sludge. These 'A' lagoons operate in a complete-mix mode with a 29-hour detention time and are designed to remove from 55-90% of the influent biochemical oxygen demand. Effluent from the 'A' lagoon goes to two clarifiers where sludge is settled out for return to the lagoons or for pumping to the primary plant for dewatering. Clarifier effluent flows to two 'B' lagoons for further aeration with a 30-hour detention time to complete the biochemical oxygen demand removal. The liquor then flows to two 'C' lagoons for chlorination and final settling prior to discharge to the river. The city owns the facility, and the paper mill pays for service based on a metered flow pro-rated share. Problems being experienced with the facility include odor and foam control which are expected to be solved with additives and minor repairs. (Kreager-FIRL)
W76-11212

OZONE PROVIDES ALTERNATIVE FOR SECONDARY EFFLUENT DISINFECTION PART 3,
Welsbach Ozone Systems Corp., Philadelphia, Pa.
C. Nebel, R. D. Gottschling, P. C. Unangst, H. J. O'Neill, and G. V. Zintel.
Water and Sewage Works, Vol. 123, No. 6, p 81-83, June, 1976. 4 fig, 41 ref.

Descriptors: *Waste water treatment, *Sewage treatment, *Ozone, *Sewage effluents, *Disinfection, Chlorine, Hydrogen ion concentration, Oxidation, Detergents, Organic compounds, Tertiary treatment.

The conclusion of a three-part article on ozone in secondary effluent disinfection deals with ozone as a serious alternative to chlorine. At the Blue Plains Treatment plant in Washington, D. C., it has been demonstrated that ozonolysis always shifts the pH toward neutrality. Ozone has also been shown to oxidize all naturally occurring cyanides in a secondary effluent and to eliminate ABS and LAS detergents. Ozone also reduces or eliminates organic pesticides from sewage effluent. It was concluded that ozonization of secondary effluent is an effective disinfection method, with tertiary treatment obtainable at no extra cost. Additionally, an ozone-induced frothing process is capable of removing significant amounts of dissolved and suspended matter via oxidation and physical separation by flotation. (See also W76-09445 and W76-09715) (Kramer-FIRL)
W76-11213

ACID TREATED CATIONIC STARCH IN THE FLOCCULATION AND DEWATERING OF SLUDGE,
W. G. Hunt, and R. J. Belz.
United States Patent 3,962,079. Issued June 8, 1976. Official Gazette of the United States Patent Office, Vol. 947, No. 2, p 754, June, 1976.

Descriptors: *Patents, *Sludge treatment, *Flocculation, *Dewatering, Municipal wastes, Cations, Waste treatment.
Identifiers: Starches.

A patent for a process to flocculate and dewater municipal raw primary sludge is presented. The process involves adding between 0.007-0.200% (based in dry weight of the sludge) of an acid treated gelatinized cationic starch ether of amine butene halide to the sludge. The degree of amine butene halide substitution in the reagent is between 0.15 and 0.25, and the reagent fluidity ranges between 30-50 ml. The sludge is then dewatered to approximately below 70% moisture. (Kreager-FIRL)
W76-11214

PROCESS FOR CONVERTING AQUEOUS SEWAGE TO POTABLE WATER,
Texaco Inc., New York. (Assignee).
H. V. Hess, W. F. Franz, and E. L. Cole.
United States Patent 3,962,076. Issued June 8, 1976. Official Gazette of the United States Patent Office, Vol. 947, No. 2, p 752-753, June, 1976. 1 fig.

Descriptors: *Sewage treatment, *Water reuse, *Potable water, *Water purification, *Patents, Organic compounds, Mineral water, Brines, Sludge, Byproducts, Separation techniques, *Waste water treatment.

A patent for a process to convert aqueous sewage containing dissolved brine-forming minerals and organic compounds to potable water and coke is described. The process involves the following steps: separating the sewage into a primary sludge and a relatively cool primary effluent containing the dissolved minerals; passing the effluent into direct counter-current contact with relatively hot hydrocarbon liquid under a pressure of 1000-3000 lbs/sq. in. and at a temperature of between 600 and 700 F, thereby forming a hydrocarbon minerals-free water solution, a cooled hydrocarbon, and a hot concentrated minerals-containing brine solution; separting the hydrocarbon from the water; flashing at least a part of the water; condensing the water for potable use; pressurizing the sludge to around 1000-3000 lbs/sq in.; and injecting the hot brine into the sludge in order to coke the sludge in the liquid phase and form a reject coker effluent, gases, and coke. (Kreager-FIRL)
W76-11215

SYSTEM FOR TREATING SLUDGE,
Inoue-Japan Research, Inc., Yokohama (Japan). (Assignee).
K. Inoue, and A. Shimizu.
United States Patent 3,962,069. Issued June 8, 1976. Officical Gazette of the United States Patent Office, Vol. 947, No. 2, p 750, June, 1976. 1 fig.

Descriptors: *Patents, *Sludge treatment, *Electrochemistry, *Dewatering, Waste treatment, Equipment, Electrodes.

A patent for a device which treats sludge is described. The apparatus consists of the following components: a vessel for receiving a bath of the sludge, an electrically conductive member with a screen-like perforated surface that is continuously displaceable through and outside of the bath along a predetermined path to form a first electrode, a second electrode juxtaposed with the first electrode in the bath, a power supply for applying an electric potential across the two electrodes to electrochemically effect a flow of water from the sludge through the electrode perforations on which the sludge deposits, a means for removing the sludge deposits from the perforated surface, a means for detecting the water content of the sludge deposit, and a means for controlling the electrical potential of the apparatus so that a desired water content of the sludge deposit can be maintained. (Kreager-FIRL)
W76-11216

PROCESS FOR TREATING WASTE WATER,
Air Products and Chemicals, Inc., Allentown, Pa. (Assignee).
K. Wyatt.
United States Patent 3,960,717. Issued June 1, 1976. Official Gazette of the United States Patent Office, Vol. 947, No. 1, p 305, June, 1976. 1 fig.

Descriptors: *Patents, *Waste water treatment, *Activated sludge, *Aeration, *Organic compounds, *Nitrogen, Gases, Oxygen, Biological treatment, Separation techniques, Recycling.

A patent for an activated sludge process designed to treat waste water containing organic matter and dissolved nitrogen gas is described. The waste water is first pretreated in an enclosed zone by contact with an oxygen enriched stripping gas having an oxygen content in excess of that of air and a nitrogen partial pressure less than that of air. At least 25% (by weight) of the dissolved nitrogen gas is stripped from the waste water and vented from the pretreatment chamber. The pretreated waste water is then introduced along with recirculated activated sludge into an enclosed aeration zone where an oxygen enriched aeration gas is also introduced. Biological degradation of the organic matter in the waste water occurs in this enclosed mixed liquor aeration zone. The mixed liquor is then discharged from the aeration zone, with the activated sludge being separated from the liquor and recirculated back to the aeration zone. The oxygen enriched stripping gas used in the pretreatment stage consists of at least some oxygen enriched aeration gas withdrawn from the mixed liquor aeration zone of the apparatus. (Kreager-FIRL)
W76-11217

METHOD OF PROCESSING REFUSE AND/OR SLUDGE AND A PLANT FOR CARRYING OUT THE METHOD,
J. R. Kaelin.
United States Patent 3,960,537. Issued June 1, 1976. Official Gazette of the United States Patent Office, Vol. 947, No. 1, p 255-256, June, 1976. 1 fig.

Descriptors: *Patents, *sludge treatment, *Solid wastes, *Waste treatment, *Byproducts, *Biological treatment, Equipment, Design criteria, Fertilizers, Organic compounds, Treatment facilities.
Identifiers: Compost.

A patent for a biological conversion process and apparatus designed to form compost from refuse or thickened sludge is described. The material to be treated is placed into the top of a continuous treatment chamber where it is permeated with a gas mixture delivered under elevated pressure by several gas distributor blades in the chamber. The distributor blades are rotated about an axis which is parallel to the direction in which the material to be treated passes. The gas mixture is exhausted by means of suction outlets which are associated with each gas distributor blade and are located in the side wall of the treatment chamber. The treated material is discharged at the bottom of the treatment chamber. (Kreager-FIRL)
W76-11218

SEWER WASTE WATER TREATING AGENT PRODUCED FROM WASTE CRACKING CATALYST,
Catalysts and Chemicals Industries Co., Ltd, Tokyo (Japan). (Assignee).
S. Sanga, and Y. Nishimura.
United States Patent 3,960,760. Issued June 1, 1976. Official Gazette of the United States Patent Office, Vol. 947, No. 1, p 317-318, June, 1976.

Descriptors: *Patents, *Waste water treatment, *Ammonium salts, *Heavy metals, *Byproducts, Catalysts, Ions, Chemical wastes, Industrial wastes.

A patent for a process that produces a powder useful for removing ammonium ions and heavy metal ions from waste water is described. Waste silica-alumina catalyst particles are utilized as the starting material. The method involves soaking catalyst particles previously used in a fluid-bed catalytic cracking unit in an aqueous sodium hydroxide solution (0.2-0.5 normal concentration) at a temperature between 70 and 105C for from 2-48 hours. Anywhere between 50-100 milliliters of sodium hydroxide solution is used per 10 grams of waste catalyst particles treated. The catalyst particles are then removed from the sodium hydroxide solution and are washed and dried to obtain a powder useful for treating waste water. (Kreager-FIRL)
W76-11219

METHOD AND APPARATUS FOR TREATING LIQUID SEWAGE AND WASTE,
W. R. Lebo.
United States Patent 3,960,718. Issued June 1, 1976. Official Gazette of the United States Patent Office, Vol. 947, No. 1, p 306, June, 1976. 1 fig.

Descriptors: *Patents, *Waste water treatment, *Aeration, *Organic wastes, *Byproducts, Nutrients, Fertilizers, Sewage treatment, Oxygenation.

A patent for a process designed to treat liquid waste containing sewage and/or manure such that the liquid can be used as a plant nutrient and soil conditioner is described. The liquid waste is fed into a cone-shaped pressure vessel into which a stream of pressurized oxygen-containing gas is injected. The oxygen injection is designed to impart a centrifugal motion to the liquid waste and impinge against the solids in the liquid with sufficient force to break the solids into small particles. The oxygen-containing gas also thoroughly aerates the liquid material and pressurizes the vessel such that the pressure above the liquid in the vessel is between 4 and 15 pounds/sq in. Sulfuric acid is then injected into the liquid material so that the material's pH can be adjusted to 3.0 or less for the purpose of sterilization; the pH is then readjusted to between 6-7. The gas pressure above the liquid level in the vessel is then allowed to cause the discharge of the liquid material from the vessel onto a compost material such as sawdust, ground bark, peat-moss, straw, or wood chips. (Kreager-FIRL)
W76-11220

COMPOSITIONS FOR TREATING DOMESTIC AND INDUSTRIAL LIQUID WASTES,
Chemlan Co., Inc., Biddeford, Ma. (Assignee).
G. M. Chappell.
United States Patent 3,963,637. Issued June 15, 1976. Official Gazette of the United States Patent Office, Vol. 947, No. 3, p 1270, June, 1976. 1 fig.

Descriptors: *Patents, *Flocculation, *Waste water treatment, *Industrial wastes, *Domestic wastes, Municipal wastes, Organic compounds, Inorganic compounds, Liquid wastes.

A patent for an acid formula composition used in flocculating industrial, domestic, and municipal liquid wastes is described. The composition consists of the following components: 30-98% (by weight) of aluminum sulfate; 2-20% (by weight) of an alkali metal chloride; 0.0005-0.1% (by weight) of sodium or potassium hypochlorite; 10-25% (by weight) of an inorganic acid consisting of phosphoric, hydrochloric, sulfuric, or nitric acid; and 1-25% (by weight) of an organic acid consisting of oxalic, formic, acetic, or lactic acid. (Kreager-FIRL)
W76-11221

INTEGRAL CIRCULAR WASTEWATER TREATMENT PROCESS,
Union Carbide Corp., New York. (Assignee).
L. M. La Clair, J. R. McWhirter, and W. L. Ross.
United States Patent 3,963,609. Issued June 15, 1976. Official Gazette of the United States Patent Office, Vol. 947, No. 3, p 1261, June 1976. 1 fig.

Descriptors: *Patents, *Waste water treatment, *Biochemical oxygen demand, *Aeration, *Activated sludge, Biological treatment, Design criteria, Oxidation, Recycling, Oxygen, Separation techniques.

A patent for a process to reduce the biochemical oxygen demand of waste water is described. The process involves aeration with at least 50% oxygen in the presence of recycled activated sludge to achieve biological oxidation and biochemical oxygen demand reduction. The oxygen feed gas, waste water, and activated sludge are mixed in a first aeration zone wherein a fluid is simultaneously recirculated; and the partially oxygenated liquor as well as the gas which is partially depleted of oxygen are then separately introduced into a second aeration zone for continuous mixing and fluid recirculation. The further oxygenated liquor from the final aeration zone which has a reduced biochemical oxygen demand is separated into effluent water and activated sludge in a clarification zone, with at least part of the sludge being returned to the first aeration zone for recycling. (Kreager-FIRL)
W76-11222

PROCESS FOR THE PURIFICATION OF WASTE WATERS,
Tecneco S.p.A., Fano (Italy). (Assignee).
G. Pascarella, and F. Salvemini.
United States Patent 3,962,077. Issued June 8, 1976. Official Gazette of the United States Patent Office, Vol 947, No. 2, p 753, June, 1976. 1 fig.

Descriptors: *Waste water treatment, *Patents, *Industrial wastes, *Resins, *Reverse osmosis, *Electrolysis, Chemical precipitation, Neutralization, Evaporation, Organic compounds, Inorganic compounds, Recycling, Cations, Anions.

A patent for a process to treat wastes containing resins used for processing sugar juices is described. The process involves the following steps: feeding waste water from the regeneration of decoloring resins to a reverse osmosis section; feeding waste waters from the regeneration of anionic and cationic demineralizing resins to anodic and cathodic compartments, respectively, of electrolytic cells for electrolysis; mixing and neutralizing the treated cationic and anionic streams, subjecting the waters to a reverse osmosis treatment, and mixing them with treated solution from the first step; feeding the treated water from the last step to an evaporator for recovery of dry organic compounds; and feeding water from the regeneration of decalcifying resins to a precipitation section containing sodium hydroxide and carbon dioxide and subsequently neutralizing the water prior to a final reverse osmosis treatment. The waste water treated contains both inorganic and organic compounds which may or may not be ionizable. (Kreager-FIRL)
W76-11223

PROCEEDINGS OF THE SOUTHEASTERN CONFERENCE ON WATER SUPPLY AND WASTEWATER IN COASTAL AREAS,
North Carolina Water Resources Research Inst., Raleigh.
Held at Wrightsville Beach, N. C., April 2-4, 1975, 187 p. Edited by James M. Stewart. $10.00.

Descriptors: *Southeast U. S., *Waste disposal, *Water supply, Waste water disposal, Waste disposal wells, Groundwater resources, Waste water treatment, *Alternative planning, Land management, *Coastal plains, Marine biology, Financing, Financial feasibility, Water reuse, Institutions, Estuarine environment, Reviews, Ecology.
Identifiers: *Ocean outfalls, Coastal areas, Land application, Public participation, Marine environment, Treatment alternatives.

Among the most valuable resources of the Southeastern United States are its coastal lands and waters. The coastal areas, and in particular their estuaries, are among the most biologically productive regions of the nation, spawning major sports and commercial fisheries. The extremely high recreational and esthetic values of coastal lands and waters carry the seeds of their own destruction through their attractiveness for economic development. This Conference with 17 major presentations was conducted to review the State of the Art of proper planning and management of water supply and wastewater disposal is coastal areas. Special attention was paid to defining technological and institutional alternatives, their relation to land use planning and environmental protection, and to identifying those water and wastewater problems of significance in coastal areas. The Conference was sponsored by the Coastal Plains Center for Marine Development Services, Coastal Plains Regional Commission, Water Resources Research Institute of The University of North Carolina, and the University of North Carolina Sea Grant Program. (See W76-11225 thru W76-11230) (Stewart-North Carolina State)
W76-11224

WATER SUPPLY AND WASTEWATER DISPOSAL - PLANNING AND PROBLEMS - IN COASTAL AREAS,
Oesen (Henry von) and Associates, Inc., Wilmington, N. C.
P. S. Denison.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, University of North Carolina, p 7-11.

Descriptors: *Water supply, *Waste water treatment, *Domestic wastes, *Sewerage, *Waste water disposal, *Coasts, *Outlets, Atlantic Ocean, Atlantic coastal plain, *North Carolina, Planning, Programs, Oceans, Treatment, Sewage treatment, Estuarine environment, Estuaries.
Identifiers: Regional planning.

A review of water supply and waste water disposal problems in coastal areas of the United States is presented, with particular emphasis on the North Carolina area. Limited local groundwater supplies in beach communities of North Carolina are diminishing such that plans are underway to augment these supplies with additional potable water transported from more productive mainland areas. Discharges of domestic sewerage wastes into the coastal soils are beginning to adversely affect fragile estuarine waters; the most viable solution to the problem appears to be the collection and treatment of such wastes, followed by disposal of the effluent residual into the Atlantic Ocean via outfalls. Local and regional water supply and waste water treatment planning programs throughout North Carolina are outlined. (See also W76-11224) (Kreager-FIRL)
W76-11225

OCEAN OUTFALL DISPOSAL SYSTEMS,
Engineering-Science, Inc., Berkeley, Calif.
D. L. Feuerstein.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, University of North Carolina, p 12-26, 2 fig, 1 tab.

Descriptors: *Waste water disposal, *Waste water treatment, *Coasts, *Waste dilution, *Atlantic Ocean, *Outlets, *Mathematical models, *Dispersion, *Diffusion, Design criteria, Disposal, Treatment, Feasibility, Cost-benefit analysis, Evaluation.
Identifiers: *Ocean outfalls.

A theoretical examination of mechanisms affecting the diminution of waste water constituents discharged from ocean outfalls is presented along with an evaluation of the efficacy of submarine outfall disposal systems for East Coast conditions. Mathematical expressions are derived for predicting the initial dilution occurring in the immediate vicinity of a diffuser, subsequent dilution resulting from lateral dispersion, and diminution caused by the disappearance or decay of non-conservative waste water constituents. Proper diffuser design is shown to be capable of effecting dilutions on the order of 50 to 100 in the initial mixing zone. The use of waste water treatment facilities in conjunction with outfall discharge is also considered, and it is shown that increasing treatment levels can be matched with decreasing dilution capacities of disposal facilities to satisfy the same receiving water quality objectives. Submarine outfall disposal systems on the East Coast appear to be cost-effective and are recommended for evaluation. (See also W76-11224) (Kreager-FIRL)
W76-11226

LAND DISPOSAL OF WASTEWATER,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 5E.
W76-11227

SHALLOW SUBSURFACE DISPOSAL OF WASTEWATER,
North Carolina Dept. of Natural and Economic Resources. Div. of Environmental Management.
For primary bibliographic entry see Field 5E.
W76-11228

THE ROLE OF CONVENTIONAL WASTEWATER TREATMENT IN COASTAL AREAS,
North Carolina Univ. at Chapel Hill. Wastewater Research Center.
J. C. Brown.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, University of North Carolina, p 75-86. 1 tab, 8 ref.

Descriptors: *Waste water treatment, *Waste water disposal, *Coasts, *Treatment facilities, Oceans, Outlets, Nitrogen, Phosphorus, Evaluation, Water quality control, Water spreading, Pretreatment(Water).

An evaluation of the role of conventional waste water treatment in coastal area water quality management is presented. Secondary treatment appears to be sufficient for maintaining current water quality standards, and additional processes can be added to conventional treatment plants for the removal of nitrogen or phosphorus as nutrient discharge limitations are developed in the future. When removal of nutrients is not technically or economically feasible at a treatment plant, conventional secondary treatment can serve as a pretreatment for ultimate disposal by land-spreading methods. Ocean outfalls offer the most environmentally and ecologically attractive solution for permanent and resort communities located close to the ocean, with conventional treatment methods serving as pre-treatment for ultimate disposal in the ocean. (See also W76-11224) (Kreager-FIRL)
W76-11229

SUMMARY: TECHNOLOGICAL ALTERNATIVES FOR WATER SUPPLY AND WASTEWATER DISPOSAL IN THE COASTAL AREA,
Clemson Univ. S. C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5E.
W76-11230

LAND APPLICATION OF WASTEWATER.
Environmental Protection Agency, Philadelphia, Pa. Region III.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 438, $4.75 in paper copy, $3.00 in microfiche. Proceedings of a research symposium held at the University of Delaware, Newark, Delaware on November 20-21, 1974. Published May 1, 1975 as Report EPA 903/9-75-017.

Descriptors: *Waste water treatment, *Waste water disposal, Percolation, Land use, Land reclamation, *Water reuse, Irrigation, Recycling, Infiltration, *Overland flow, *Agricultural runoff, Agricultural watersheds, *Farm wastes.
Identifiers: *Land application.

Table of contents include: EPA Guidance and Policy on Land Treatment; Land application research at Robert S. Kerr environmental research laboratory; Land application practices and design criteria; Public health aspects of land application of wastewater effluents; Educational and informational needs for achieving public acceptance; Experiences at Penn State with land application; The environmental and sociological impact of recycling of agricultural waste by land use; Experience with land application of wastewater and state regulations and the pennypack watershed; Experience with land application of wastewater and state regulations- pennypack watershed, Pennsylvania; Land disposal of wastewater in the commonwealth of Pennsylvania-A regulatory view; Overland flow treatment of wastewater- a feasible approach; Infiltration-percolation systems; and land application of treated sewage in the mountain state. (See also W76-11232 thru W76-11237)
W76-11231

LAND APPLICATION RESEARCH AT ROBERT S. KERR ENVIRONMENTAL RESEARCH LABORATORY,
Robert S. Kerr Environmental Research Laboratory. Ada, Okla.
R. E. Thomas, and C. C. Harlin, Jr.
In: Land Application of Wastewater, November 20-21, 1974, Newark, Delaware, p 3-12. 22 ref.

Descriptors: *Waste water treatment, *Waste water disposal, *Percolation, *Infiltration, *Irrigation, *Overland flow, Research priorities, Programs, Groundwater, Lakes, Municipal wastes, Denitrification, Biodegradation, Organic compounds, Sewage treatment, Phosphorus.
Identifiers: Land application.

Research being conducted by the Robert S. Kerr Environmental Research Laboratory for the Environmental Protection Agency to evaluate various methods of waste water management which incorporate land application are outlined. Crop irrigation is being investigated in terms of locating and evaluating currently available quantitative information on application rates, crop responses, soil changes, and groundwater quality changes. Projects designed to demonstrate crop irrigation approaches in geographic areas where historical information is scarce are also being conducted. Infiltration-percolation investigations include four studies in water-short southwestern states and two studies in water-rich north central states. These studies involve assessing the effectiveness of the infiltration approach for direct recharge of a potable groundwater supply with secondary effluent, evaluating the use of infiltration-percolation for rendering municipal effluent suitable for filling and maintaining the water level of recreational lakes, and evaluating existing infiltration-percolation facilities. Projects designed to assess the feasibility of treating raw sewage by overland flow are also being conducted in addition to basic research on phosphorus retention in soils, denitrification, biodegradation of organics, and climatology. (See also W76-11231) (Kreager-FIRL)
W76-11232

LAND APPLICATION PRACTICES AND DESIGN CRITERIA,
Metcalf and Eddy, Inc., Palo Alto, Calif.
C. E. Pound, and R. W. Crites.
In: Land Application of Wastewater, November 20-21, 1974, Newark, Delaware, p 13-26. 4 fig, 5 tab, 19 ref.

Descriptors: *Irrigation, *Infiltration, *Percolation, *Overland flow, *Waste water treatment, Waste water disposal, Design criteria, Costs, Soil properties, Water quality, Sites, Performance, Evaluation.
Identifiers: *Land application.

Engineering criteria for the design of waste water treatment and disposal systems involving land application are outlined. Irrigation, infiltration-percolation, and overland flow techniques are reviewed in terms of site characteristics, climatic factors, waste water loss, crop production, expected treatment performance, liquid loading rates, soil type, and applicable water quality criteria. A preliminary analysis of an actual case study is included to illustrate how these different land application methods can be combined to overcome restrictions in topography, soil permeability, water quality criteria, and construction costs. Emphasis is placed on considering land treatment methods as unit processes and selecting treatment methods so as to provide a design that is tailored to the specific site. (See also W76-11231) (Kreager-FIRL)
W76-11233

EXPERIENCES AT PENN STATE WITH LAND APPLICATION,
Pennsylvania State Univ., University Park. School of Forest Resources.
W. E. Sopper.
In: Land Application of Wastewater, November 20-21, 1974, Newark, Delaware, p 39-51. 14 tab, 9 ref.

Descriptors: *Sewage disposal, *Recycling, *Irrigation, Municipal wastes, Waste water treatment, Waste water disposal, Land reclamation, Evaluation, Water management, Water supply, Forests.
Identifiers: Spray irrigation, *Land application.

The results of experiments involving the spray irrigation of cropland and forested areas with treated municipal sewage effluent are presented. Combinations of agronomic and forested areas appear to provide the greatest flexibility for waste recycling operations. Such systems are more adaptable to small cities and suburbs than to large metropolitan areas because of the availability of open land close to the waste water treatment plant in the former case. However, the land area requirement is not a major prohibitive factor. At the recommended level of irrigation (5 cm/week), only 52 hectares of land is required for the disposal of 4 million liters of waste water/day. Major metropolitan areas may be able to utilize golf courses, playing fields, forest preserves and parks, greenbelts, scenic parkways, and perhaps even divided highway and beltway medial strips for waste

water disposal. The experimental results also indicate that municipal waste water might be used to reclaim and revegetate many of the barren bituminous strip mined spoil banks and anthracite refuse banks existing throughout the Appalachian region and restore them to a more esthetic and productive state. (See also W76-11231) (Kreager-FIRL)
W76-11234

OVERLAND FLOW TREATMENT OF WASTE-WATER - A FEASIBLE APPROACH,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
P. G. Hunt, and C. R. Lee.
In: Land Application of Wastewater, November 20-21, 1974, Newark, Delaware, p 71-83. 13 fig, 17 ref.

Descriptors: *Overland flow, *Waste water treatment, *Waste water disposal, *Recycling, Monitoring, Flow, Water quality, Costs, Microorganisms, Soils, Surfaces.
Identifiers: *Land application.

The use of overland flow for the treatment and disposal of waste water is discussed in terms of its theoretical basis and system operation. In an overland flow system, the waste water is applied at the top of gentle sloping hills and is allowed to flow over the soil surface down to collection channels. The treatment is represented by an intimate interaction among the soil surface layer, surface organic mat, plants, and microorganisms. The common length of the slope is 100-300 ft, and normally the system is employed on slopes ranging from 2-8%. Application rates are low, generally less than 0.5 acre-in/day; waste water, however, is applied for 5 days/week so that the weekly application rate is about 2.5 acre-in. The ability to monitor waste water as it leaves the treatment site is an especially valuable characteristic of overland flow systems. Most of the treated waste water is available at central collection channels for quality determinations and for discharge or other uses. The cost of overland flow systems is about $2000/acre. (See also W76-11231) (Kreager-FIRL)
W76-11235

INFILTRATION-PERCOLATION SYSTEMS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
H. Bouwer.
In: Land Application of Wastewater, November 20-21, 1974, Newark, Delaware, p 85-92. 4 fig, 11 ref.

Descriptors: *Infiltration, *Percolation, *Waste water treatment, *Waste water disposal, *Recycling, Rates of application, Infiltration rates, Hydraulics, Nitrogen, Phosphorus, Nitrates, Phosphates, Dentrification.
Identifiers: Land application.

The use of infiltration-percolation systems for the treatment and disposal of waste water is discussed. The waste water in infiltration-percolation systems is applied at much higher rates (0.3-3.0 m/week) than with low-rate or irrigation-type systems, resulting in the obvious advantage of low land requirements (1-10% of that for low-rate systems). High-rate systems require relatively permeable soil such as sandy loams to medium sands. The transmissibility of the underlying aquifer should also be sufficiently high to conduct the water laterally away from the infiltration area without undue water table rises. Another advantage of high-rate systems is that the infiltration rates are much higher than the evapotranspiration rate. Because of the high hydraulic loading rates in high-rate systems, the amounts of nitrogen, phosphorus, and other elements entering the ground with the waste water are much higher than crops can remove. Thus, special management techniques are required to stimulate dentrification of nitrate and immobilization of phosphate in the soil to yield renovated water of acceptable quality. It may be desirable to restrict the spread of the renovated water into the groundwater basin by selecting the infiltration site so that the renovated water drains into surface water. (See also W76-11231) (Kreager-FIRL)
W76-11236

LAND APPLICATION OF TREATED SEWAGE IN THE MOUNTAIN STATE,
Campaign Clean Water, Charleston, W.Va.
E. Light.
In: Land Application of Wastewater, November 20-21, 1974, Newark, Delaware, p 93-94. 7 ref.

Descriptors: *Sewage treatment, *Sewage disposal, *Municipal wastes, *Overland flow, *Irrigation, *West Virginia, Soils, Topography, Climates, Land reclamation, Mountains, Application rates, Feasibility, *Waste water treatment.
Identifiers: *Land application.

The feasibility of using land application techniques (overland flow, spray irrigation) for the treatment of municipal sewage wastes in the state of West Virginia is discussed. Objections to land treatment in the state because of the topography, climate, and soil of the Appalacian Mountains are cited as being invalid based on the success of land application techniques in other areas of the country with similar problems. About one-third of the soil scattered throughout the Appalachians is estimated to be suitable for land treatment. Erosion is not expected to be a problem in West Virginia if application rates are not too high since the state is heavily forested. The state's strip mines and coal refuse piles are considered prime land treatment sites. Since 70 cities in West Virginia will be required to go to advanced treatment, land application of municipal wastes is proposed as a feasible alternative that is economically realistic. (See also W76-11231) (Kreager-FIRL)
W76-11237

PROCEEDINGS OF THE ANNUAL CONFERENCE, ONTARIO SECTION, AMERICAN WATER WORKS ASSOCIATION; POLLUTION CONTROL ASSOCIATION OF ONTARIO; AND ONTARIO MUNICIPAL WATER ASSOCIATION.
For primary bibliographic entry see Field 5F.
W76-11249

A NEW CONCEPT IN SMALL WATER SYSTEMS,
MacLaren (James F.) Ltd., Toronto (Ontario).
G. A. Aldworth.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 228-248. 12 fig, 1 tab.

Descriptors: *Water supply, *Sewage treatment, *Design criteria, Topography, Climates, *Freezing, *Waste water treatment, Treatment facilities, Equipment, Materials, Insulation, Costs, *Water treatment, Temperature.

Design criteria associated with the development of special water supply and sewage treatment systems subject to geographical and climatic constraints are outlined. Three particular projects are described: the development of an air-transportable above-ground water and sewage treatment system suitable for ambient temperatures between -25 and +125 F, the upgrading of existing water supply systems in Northern Newfoundland and Southern Labrador to render them less susceptible to freeze-up, and the development of a full-scale shallow-buried water and sewage system in very rocky terrain. Detailed information on special equipment used (plastic piping, water heaters, pipe insulation, pipe frost covers, bleeders, mobile fire pumps) and the costs involved is provided along with diagrams of each installation. (See also W76-11249) (Kreager-FIRL)
W76-11253

THE TREATMENT OF WATER PURIFICATION PLANT WASTES,
Gore and Storrie Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 5F.
W76-11256

PROCEEDINGS OF THE THIRD NATIONAL CONFERENCE ON COMPLETE WATERUSE: SYMBIOSIS AS A MEANS OF ABATEMENT FOR MULTI-MEDIA POLLUTION,
(1976), 628 p. Held at Cincinnati, Ohio, June 27-30, 1976. Sponsors: American Institute of Chemical Engineers and Environmental Protection Agency Technology Transfer. Edited by L. C. Cecil and P. C. Welsh. EPA R804195010.

Descriptors: *Water reuse, *Symbiosis, Ecology, *Waste water treatment, *Pollution abatement, *Separation techniques, Industrial wastes, Municipal wastes, Planning, Management.

The Conference includes papers under the following major categories: Symbiosis; Planning; The Marketplace Sink; Wastewater Reuse; Separation Methods - Adsorption; Separation Methods - Ion Exchange; Separation Methods - Magnetic; Separation Methods - Membranes; Urban Streams; Power; Energy Recovery; Cooling Towers; Coal; Health; Food Processing; Municipal; and Sludge Utilization. (See also W76-11258 thru W76-11274)
W76-11257

SYMBIOSIS MAKES COMPLETE WATER REUSE PRACTICAL,
L. K. Cecil.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 12-14.

Descriptors: *Water reuse, *Recycling, *Municipal wastes, *Farm wastes, *Industrial wastes, Byproducts, Planning, Pollutants, Sewage, Urban runoff, *Waste water treatment, *Symbiosis.
Identifiers: Municipal-industrial wastes.

The establishment of a symbiotic relationship between municipal, industrial, and agricultural activities in an area is proposed as a means to achieve complete water reuse. Sewage and surface runoff from a city can be utilized by industries which are properly situated adjacent the city for heat dissipation requirements. Garbage can be fractionated into burnable compounds for the production of heat energy, with the unburnable fractions being converted into marketable forms. Industries can also utilize agricultural wastes for beneficial purposes if farms are properly located around a city. Waste water from industry, in turn, can be utilized by agriculture if farms are located within a reasonable distance of industrial complexes. Thus, by proper collaboration of cities, industries, and farms, the goal of zero discharge of pollutants into the aqueous environment can be approached. (See also W76-11257) (Kreager-FIRL)
W76-11258

PUERTO RICO: ALONG THE ROUTE OF WATER REUSE,
Environmental Protection Agency, San Juan, Puerto Rico.
M. M. Irizarry.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 46-52. 8 fig, 2 tab, 8 ref.

Descriptors: *Water reuse, *Recycling, *Puerto Rico, *Water supply, *Water manage-

ment(Applied), Irrigation, Infiltration, Percolation, Saline water intrusion, Industrial water, Groundwater recharge, Research and development, Programs, Organizations.

Activities concerning the reuse of waste water in Puerto Rico are reviewed. The Ponce Regional Water Resources Management Study, which is a cooperative effort between the Puerto Rican government and the U. S. Army Corps of Engineers, is concentrating on waste water management, water supply management, flood control, conservation of fish and wildlife, and recreation, with emphasis being given to water supply. The study covers 14 municipalities over an area of 734 sq mi and is evaluating the following reuse alternatives: the use of secondary treated effluent from water treatment plants for irrigation, infiltration, and percolation; the use of waste water for industrial purposes; and the use of waste water to prevent salt water intrusion. The Corps of Engineers is also conducting an island-wide water supply study with the Puerto Rico Department of Natural Resources. The U. S. Geological Survey has initiated a research project in Fort Allen, Salinas, Puerto Rico dealing with the use of secondary effluent for groundwater recharge. (See also W76-11257) (Kreager-FIRL)
W76-11259

REMOVAL AND RECOVERY OF AMMONIA FROM ANAEROBIC DIGESTER SUPERNATANT,
CH2M/Hill, Redding, Calif.
R. W. Prettyman, and L. G. Kepple.
In: 3rd National Conference on Complete WateRuse, June 27-30, 1976, Cincinnati, Ohio, p 95-99. 7 fig, 2 tab, 3 ref.

Descriptors: *Waste water treatment, *Byproducts, *Anaerobic digestion, *Ammonia, Fertilizers, Water reuse, Recycling, Water reclamation, Effluents, Industrial water, Nitrogen, Phosphorus, Absorption, Aeration, Flocculation, Chemical precipitation, Organic acids, Sulfates.
Identifiers: Stripping.

An ammonia removal and recovery process for rendering anaerobic digester supernatant suitable for industrial reuse is described. The supernatant is first aerated to strip excess carbon dioxide so that lime requirements are kept minimal. Lime is then added to precipitate phosphorus, flocculate organic matter, and obtain a pH of 11 for stripping ammonia nitrogen. The ammonia removal and recovery process employs an ammonia stripping unit and an ammonia absorption unit and produces ammonia in the form of a common fertilizer such as ammonium sulfate which can be sold as byproduct. In the stripping unit, the high pH influent stream flows down over packing material, and the recirculating air stream passes upward and carries the ammonia gas-laden air to the absorption unit. The stripping unit effluent which is relatively low in ammonia nitrogen is discharged from the bottom of the unit. Ammonia-laden air contacts an acidic absorbent liquid in the absorber unit, with ammonia gas being dissolved in the absorbent liquid and converted to ammonium ions. If sulfuric acid is added, for example, an ammonium sulfate solution is formed. (See also W76-11257) (Kreager-FIRL)
W76-11260

UNION CARBIDE'S REUSE OF SEWAGE WATER,
Carbide Chemicals Co., Bombay, India.
R. N. Banerji.
In: 3rd National Conference on Complete Water Reuse, June 27-30, 1976, Cincinnati, Ohio, p 161-165. 1 fig, 4 tab.

Descriptors: *Sewage treatment, *Water reuse, *Water reclamation, *Symbiosis, *Industrial water, Biological treatment, Activated sludge, Aeration, Flocculation, Filtration, Water softening, Chlorination, Costs, Demineralization, Sewage, Waste water treatment.

A system for processing municipal sewage water and reusing it for industrial operations at Union Carbide's Chemicals and Plastics plant at Bombay, India is described. The sewage treatment system involves: raw water pumping and conveying, detritus matter removal, biological treatment (activated sludge) with extended aeration, clarification, chemical dosing, flocculation, sand filtration, softening, post chlorination, and demineralization. In order to make the treated water fit for industrial use and comparable with water from the municipal mains, the filtered water is passed through a softening process where the hardness is reduced from 140 milligram/liter to about 40 milligram/liter. The cost of the sewage reclaimed water is $.43/1000 imperial gallons as compared with $.72/1000 imperial gallons of municipal water. (See also W76-11257) (Kreager-FIRL)
W76-11261

GRANULAR MEDIA FILTRATION: A POSITIVE COST EFFECTIVE METHOD TO PREPARE WASTEWATERS FOR REUSE BY REMOVAL OF SUSPENDED SOLIDS,
Ecodyne Corp., Union, N. J. Industrial Waste Treatment Div.
G. R. Mace.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 185-190. 7 fig, 2 tab.

Descriptors: *Filtration, *Filters, *Granules, *Waste water treatment, *Suspended solids, Water reuse, Water reclamation, Recycling, Oil, Efficiencies, Performance, Equipment.
Identifiers: Backwashing.

The use of granular media filtration for removing suspended solids from waste waters which are intended for reuse has recently increased. Filters can effectively remove up to 200-250 ppm of suspended solids from waste waters and produce effluent clarities in the 1-15 ppm suspended solids range. Granular filters are also the only time-tested unit operation available for filtering volumes of waste water experienced in industrial waste treatment plants. Types of granular filter configurations available include: vertical gravity, deep media vertical gravity or pressure, horizontal ('hot dog'), concrete gravity, and upflow gravity or pressure types. A combination of air scouring, underdrain nozzles, and air metering tubes not only allows for the removal of suspended solids in the 200-250 ppm range but allows for the removal of up to 60 ppm of oil. Backwashing which is initiated by turbidity meters in addition to pressure differential and automatic timers is being employed to achieve the consistently low suspended solids levels required for recycling and discharge. (See also W76-11257) (Kreager-FIRL)
W76-11262

WASTEWATER RECYCLE - THE PROPER APPROACH TO EVALUATION OF DISPOSAL VERSUS REUSE,
Ecodyne Corp., Union, N. J. Industrial Waste Treatment Div.
G. R. Mace.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 191-195. 2 fig, 6 tab.

Descriptors: *Water reuse, *Water reclamation, *Waste water disposal, *Waste water treatment, *Industrial water, *Cost comparisons, *Cost analysis, Sludge disposal, Dewatering, Byproducts, Waste treatment, Economics, Water supply, Evaluation, Analytical methods, *Recycling.

A procedure for evaluating the cost of industrial waste water disposal versus recycle is presented. The procedure can be broken down into four major steps: a detailed analysis of the effluent, the effect of recycle water on the quality of the product, an analysis of waste treatment operations available, and the total economic analysis. The disposal of sludge is an especially important consideration since it is the most expensive part of the treatment system. The cost of sophisticated equipment to recover waste products should be weighed against direct disposal via landfill. The total economic analysis can be broken down into three independent analyses that need to be constructed: economic selection of individual waste treatment unit operations, economic selection of dewatering and sludge disposal alternatives, and the final economic decision of recycle versus disposal. A hypothetical case study is presented to illustrate the procedure. (See also W76-11257) (Kreager-FIRL)
W76-11263

THE EFFECTIVENESS OF GRANULAR ACTIVATED CARBON IN TREATING MUNICIPAL AND INDUSTRIAL WASTEWATERS,
ICI United States, Inc., Wilmington, Del.
P. B. DeJohn.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976. Cincinnati, Ohio, p 204-211. 3 fig, 7 tab, 20 ref.

Descriptors: *Adsorption, *Activated carbon, *Waste water treatment, *Granules, Municipal wastes, Industrial wastes, Physical properties, Coals, Performance, Isotherms, Measurement.
Identifiers: Municipal-industrial waste treatment, *Combined treatment.

The use of granular activated carbon adsorption for treating municipal and industrial waste waters is discussed. Topics covered include: methods for evaluating activated carbon, adsorption data developed on municipal wastes, the comparative physical properties of lignite and bituminous coal carbons, adsorption data developed on various types of industrial wastes, the effect of thermal regeneration on the adsorption performance of carbon, and symbiotic processes involving the utilization of carbon fines in other waste water processes and the utilization of the heat content of exit gases from other plant processes to regenerate activated carbon. Virgin bituminous coal carbons perform better than virgin lignite carbons in waste streams containing predominantly small molecules and vice versa. If the waste stream contains mostly small molecules, he granular carbon system should be designed on the basis of the performance of regenerated carbon. Isotherms can be used to determine if carbon can reduce the impurity level to the desired quantity. (See also W76-11257) (Kreager-FIRL)
W76-11264

SALA-HGMS MAGNETIC FILTERS FOR THE TREATMENT OF COMBINED SEWER OVERFLOW,
Sala Magnetics, Inc., Cambridge, Mass.
D. Allen, B. Arvidson, J. Oberteuffer, and R. Sargent.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 239-251. 8 fig, 12 tab, 19 ref.

Descriptors: *Filters, *Magnetic studies, *Waste water treatment, *Filtration, Sewage, Storm water, Flocculation, Chemical reactions, Performance, Suspended solids, Heavy metals, Bacteria, Biochemical oxygen demand, Chemical oxygen demand, Turbidity, Pilot plants, Separation techniques, *Combined sewers.
Identifiers: *Magnetic separation filters.

Bench test and preliminary pilot results are presented for the treatment of combined storm overflow and raw sewage with high gradient magnetic separation filters. Good performance was obtained with a flocculation train residence and filtration time of 3 minutes or less, a fraction of the

time required fro flocculation and processing in conventional waste treatment systems. Although the flocs formed were very small in size compared with those necessary for conventional settling or filtering, the flocs themselves were much less susceptible to physical disruption. There were also indications that the addition of a magnetic filter aid such as magnetite can reduce chemical reaction time to less than 90 seconds. Pilot plant tests on combined sewage overflow revealed cycle to cycle variations in performance not exceeding 2%, indicating the system's stability. The data also indicated that the results obtained with seeded high gradient magnetic filtration generally surpass those obtained with primary and secondary stages of conventional treatment in a single treatment stage. Typical data are presented for suspended solids, biochmical oxygen demand, chemcial oxygen demand, turbidity, heavy metals, and bacterial counts. (See also W76-11257) (Kreager-FIRL)
W76-11265

THICKENING OF SEWAGE SLUDGE WITH QUATERNARY AMMONIUM COMPOUNDS AND MAGNETIC FIELDS,
Calspan Corp., Buffalo, N. Y.
L. K. Wang, M. H. Wang, R. C. Ziegler, and M. P. Strier.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p252-258. 2 fig, 3 tab, 17 ref.

Descriptors: *Sludge treatment, *Dewatering, *Ammonium compounds, *Magnetic studies, *Disinfection, Coliforms, Iron oxides, Flocculation, Evaluation, Performance, Waste treatment, Sludge, Bacteria, Sewage sludge.
Identifiers: *Sludge thickening, Quaternary ammonium compounds.

A process using quaternary ammonium compounds and magnetic fields for the thickening of sewage sludge was evaluated. Sludge dewatering experiments were performed by adding finely divided iron oxide particles which acted as both weighting and polarization-inducing agents along with quaternary ammonium compounds which acted as both flocculating and disinfectant agents. The agglomerates (or flocs) containing the sludge solids, iron oxide, and quaternary ammonium compound were flocculated and then passed through a magnetic field for further polarization. The polarized iron ores associated with the sludge agglomerate attracted each other to form very high weight-to-surface area floc particles; and the condensed flocs, with or without treatment by secondary flocculation, then settled rapidly. The supernatant and settled sludge were simultaneously disinfected by the quaternary ammonium compound. The use of the quaternary ammonium compound resulted in better sludge thickening than that obtained from a control experiment and also resulted in a drop in total coliform count in the supernatant from more than 100,000,000/100 ml to about 160/100 ml. The application of the magnetic field proved beneficial to the sludge thickening process when the system contained iron oxide particles. (See also W76-11257) (Kreager-FIRL)
W76-11266

REVERSE OSMOSIS PILOT PLANT STUDIES FOR THE PURIFICATION AND REUSE OF EFFLUENT FROM A SANITARY WASTE TREATMENT PLANT,
Rockwell International, Golden, Colo. Rocky Flats Plant.
C. E. Plock, D. E. Hausburg, and D. R. Horrell.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 268-273. 4 fig, 5 tab.

Descriptors: *Reverse osmosis, *Waste water treatment, *Water reuse, *Reclaimed water, Sanitary engineering, Treatment facilities, Equipment, Reclamation, Dissolved solids, *Pilot plants, Performance.

Pilot plant studies on the use of reverse osmosis to treat sanitary waste treatment effluent for reuse at a nuclear weapons facility were conducted. After passing about 20 gallons/minute of treated sanitary effluent through a pre-treatment stage, a chemical treatment stage, and a final filter, a reverse osmosis unit using cellulose triacetate hollow fiber membranes was employed to produce about 17.5 gallons/minute of product water and 2.2 gallons/minute of brine for a water recovery of 89%. Cellulose triacetate membranes were selected over polyamide hollow fiber membranes because of the following advantages: lower operating pressures, high rejection rates, higher quality product water, higher water recovery, lower inorganic scaling, the absence of bacterial fouling, and less susceptibility to temperature change. The pilot plant studies indicate that a product water containing less than 100 mg/liter of total dissolved solids can be obtained and that the flow of brine to the process waste treatment evaporator will be no greater than 2% of the feed stream going to the reverse osmosis recycling plant. (See also W76-11257) (Kreager-FIRL)
W76-11267

RECLAMATION OF GAS TURBINE WASTE HEAT FOR SLUDGE DRYING,
Metropolitan Sewerage District of the County of Milwaukee, Wis.
L. A. Ernest, R. E. Birner, J. H. Schlintz, and R. M. Manthe.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 361-369. 2 fig, 2 tab, 1 ref.

Descriptors: *Sludge treatment, *Drying, *Heat transfer, *Symbiosis, *Byproducts, Treatment facilities, Equipment, Powerplants, Efficiencies, Temperature, Activated sludge, *Waste water treatment.
Identifiers: Combined cycles, Waste heat reuse.

The recovery of gas turbine waste heat for sludge drying at an activated sludge waste water treatment plantis described. Waste heat from gas turbines in the power generation section of the waste water treatment plant is diverted to 10 dryer furnaces to provide a drying temperature of 1200 F. This combined cycle operation reduces dryer fuel requirements by 70% and overall actual fuel consumption by 20%. The system is inherently safe because the dryers are normally at a negative pressure condition and consequently impose no detrimental back pressure on the gas turbine or connecting duct work. In addition, pressure sensitive devices dump the exhaust gases in the event of excessive back pressure to protect the system. (See also W76-11257) (Kreager-FIRL)
W76-11268

WASTEWATER REUSE WITHIN AN ARMY FIELD HOSPITAL,
Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
W. P. Lambert, and L. H. Reuter.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 447-456. 4 tab, 41 ref.

Descriptors: *Water reuse, *Reclaimed water, *Waste water treatment, *Hospitals, Potable water, Treatment facilities, Equipment, Efficiencies, Water purification, Brackish water, Freshwater.

A waste water reuse scheme proposed for transportable army field hospitals is described. The waste water reclamation and recycling system is designed to help meet water supply needs, to reduce logistical requirements, and to maintain necessary tactical flexibility. The system has two principal operating modes and three primary functions. An integrated mode functions to treat nonsanitary waste streams for nonpotable reuse; operation requires 85% net influent water recovery at approximately 4200 gallons/day outflow. The purified water will be used for potable use eventually. The second mode of operation has two functions. Nonsanitary waste waters from the hospital are treated for discharge to the environment by one set of unit processes, while a water purification unit treats natural fresh or brackish waters for potable use. The second operation mode involves the production of at least 3900 gallons/day of treated waste water, with at least 94% of the influent being discharged. The water purification unit produces at least 3500 gallons/day of potable water with no more than 10% influent loss. (See also W76-11257) (Kreager-FIRL)
W76-11269

TREATMENT OF ARMY M U S T FIELD HOSPITAL WASTEWATER FOR WATER REUSE,
Abcor, Inc., Cambridge, Mass. Walden Research Div.
A. Z. Gollan, M. H. Kleper, K. J. McNulty, and R. L. Goldsmith.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 462-475. 11 fig, 7 tab, 5 ref.

Descriptors: *Waste water treatment, *Desclination, *Water reuse, *Reclaimed water, *Hospitals, *Treatment facilities, Reverse osmosis, Filtration, Ozone, Chlorination, Organic compounds, Water purification, Carbon, Chemical oxygen demand, Solid wastes, Performance, Evaluation, Efficiencies, Equipment.
Identifiers: Ultrafiltration.

A 1/4-scale breadboard version of a waste water treatment system designed for transportable Army hospitals was tested. The system is designed for operation in water reuse, water desalting, and waste treatment/discharge modes. The test demonstrated that the selected sequence of unit processes (waste equalization, ultrafiltration, reverse osmosis, ozonation, and chlorination) was effective in treating a time-varying composite of individual hospital wastes. The ultrafiltration and reverse osmosis stages were highly effective in reducing the total solids and organics concentrations of the equalized waste. Overall removal efficiencies for the ultrafiltration/reverse osmosis section ranged from 88-92% for total solids, 91-93% for total organic carbon, and 92-97% for chemical oxygen demand. Rather poor removal efficiencies were obtained for the ozonation system tested. The poor performance of the ozonation system was a result of reactor design and operation, the low output of the ozone generator, the presence of a refractory organic residual in the reverse osmosis permeate, and the lack of an automatic feedback system to control ozone conversion. The average overall system water recovery for the water reuse mode was 87%. (See also W76-11257) (Kreager-FIRL)
W76-11270

THE REMOVAL OF METALS FROM WASTEWATERS BY CHEMICAL TREATMENT AND FILTRATION,
Dallas Water Reclamation Research Center, Tex.
A. C. Petrasek, Jr., and S. E. Esmond.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 502-509. 6 fig, 14 tab.

Descriptors: *Waste water treatment, *Metals, *Coagulation, *Filtration, Sewage, Lime, Arsenic compounds, Cadmium, Chromium, Mercury, Lead, Efficiencies, Performance, Evaluation, Biological treatment.
Identifiers: *Chemical treatment, Recarbonation, Alum.

The use of various chemical treatment methods along with filtration for the removal of metals from waste waters was investigated. Waste water from a sewage treatment plant was given addi-

tional biological treatment in a completely mixed activated sludge system, was chemically coagulated and filtered, and passed through an activated carbon contactor. For the chemical treatment stage, three different approaches were investigated: high pH lime coagulation, alum coagulation, and high pH lime coagulation and recarbonation. High pH lime coagulation and recarbonation was generally more effective in removing metals than was alum coagulation. This was especially true for toxic metals such as arsenic, cadmium, chromium, mercury and lead. Detailed removal percentage and changes in mean metals concentrations are reported for 25 metals. (See also W76-11257) (Kreager-FIRL)
W76-11271

WATER REUSE RESEARCH,
Dallas Water Reclamation Research Center, Tex.
A. C. Petrasek, Jr., and I. M. Rice.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 556-566. 11 fig, 13 tab, 5 ref.

Descriptors: *Waste water treatment, *Metals, *Coliforms, *Coagulation, Biological treatment, Activated sludge, Flocculation, Filtration, Adsorption, Chemical oxygen demand, Carbon, Organic compounds, Nitrogen, Nitrates, Ion exchange, Microorganisms, *Water reuse, Lime, Evaluation, Performance, Treatment facilities, Denitrification.
Identifiers: Recarbonation.

Various waste water treatment sequences were evaluated as part of a research program for developing water reuse systems. The treatment sequences evaluated consisted of the following unit processes operating in series, with the most significant difference being the type of chemical treatment utilized in the sequence: biological treatment with completely mixed activated sludge; chemical coagulation, flocculation, and clarification; multi-media filtration; and activated carbon adsorption. A chemical treatment sequence employing high pH lime coagulation and recarbonation appeared to result in the best metals removals. High pH lime coagulation was also very effective for removing indicator (coliforms) of pathogenic bacteria. Low chemical oxygen demand and soluble total organic carbon concentrations were obtained with all of the treatment processes investigated. Nitrogen removal was not a problem because of uncontrolled denitrification in the final clarifier on the activated sludge system. However, nitrate nitrogen concentrations did closely approach the 10 mg/liter standard, and the addition of an anion exchange system capable of processing about 25% of the total product water appears desirable. (See also W76-11257) (Kreager-FIRL)
W76-11272

WATER FACTORY 21,
Orange County Water District, Fountain Valley, Calif. Board of Directors.
D. G. Argo.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 567-577. 16 fig, 3 tab, 5 ref.

Descriptors: *Waste water treatment, *Reclamation, *Treatment facilities, *On-site tests, *Reclaimed water, *Water reuse, Organic compounds, Viruses, Turbidity, Heavy metals, Bacteria, Coagulation, Lime, Adsorption, Activated carbon, Chlorination, Filtration, Ammonia, Design criteria, Performance.
Identifiers: Recarbonation, Ammonia stripping.

The design and start-up of a full-scale advanced design waste water reclamation plant that is part of the Orange County California Water Factory 21 are described. The waste water reclamation plant is designed to treat 15 mgd of trickling filtered secondary effluent. The plant processes include: lime coagulation, ammonia stripping, two-stage recarbonation mixed-media filtration, activated carbon adsorption, chlorination, and blending. During the initial start-up of the plant, its ability to meet its discharge objectives was demonstrated for all parameters except mineral quality. The plant effectively removed organics, turbidity, heavy metals, bacteria, and viruses. A waste water demineralization plant is being constructed so that the mineral quality objective can be attained. Detailed diagrams are illustrated for each process, and plant effluent data are compared with discharge objectives. (See also W76-11257) (Kreager-FIRL)
W76-11273

FLY ASH - A POTENTIAL ASSET IN WASTE-WATER TREATMENT,
Northwestern Univ., Evanston, Ill.
N. Gangoli, and G. Thodos.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 623-628. 4 tab, 29 ref.

Descriptors: *Fly ash, *Byproducts, *Waste water treatment, *Sludge treatment, Industrial wastes, Chemical oxygen demand, Organic compounds, Heavy metals, Phosphates, Dewatering, Phenol, Alkyl benzene sulfonate, Odor, Surfactants, Adsorption, Coagulation, Chemical precipitation.

Applications which utilize fly ash in waste water treatment operations are reviewed. Fly ash has been used as a filter aid in dewatering sewage sludges as a coagulant and precipitating agent, and for adsorbing dissolved substances in waste waters. In addition to enhancing the dewatering of activated and digested sludges, fly ash is also effective in removing organics and phosphates. Fly ash has been used as an adsorbent for the recovery of phenol from industrial waste waters and for the removal of alkyl benzene sulfonate, a surfactant used in detergents. Paper mill effluents have been treated with fly ash in eliminating of odor and the removal of chemical oxygen demand. The high alkalinity associated in fly ash makes this substance an excellent treatment aid for the precipitation of heavy metals present in the effluent streams of electroplating and metal finishing industries.(See also W76-11257) (Kreager-FIRL)
W76-11274

A SIMULATION MODEL FOR PHOSPHORUS WASTE DISCHARGES IN THE LAKE ERIE BASIN,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W76-11317

FEASIBILITY OF CHLORINATING FEEDLOT RUNOFF TO MEET BACTERIAL WATER QUALITY STANDARDS,
Maryland Univ., College Park. Dept. of Agricultural Engineering.
J. A. Merkel.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 576, $3.50 in paper copy, $3.00 in microfiche. Maryland Water Resources Research Center, College Park, Technical Report No. 37, (1976). 15 p, 5 tab. OWRT A-024-Md(1) 14-13-0001-5020.

Descriptors: *Agricultural runoff, Organic wastes, Runoff, Coliforms, Chesapeake Bay, *Salinity, Livestock, *Chlorination, *Feed lots, *Farm wastes, Water quality standards, *Waste water treatment, Bacteria, *Bactercides.
Identifiers: Detention ponds.

An increase in livestock production along with a more intensive usage of the Chesapeake Bay by boaters, vacationers, and the local population has placed increased demands on the organic carrying capacity of the Bay and its tributaries. This situation was brought into focus in 1971 when the Maryland State Department of Health and Mental Hygiene was forced to close certain shellfish waters and issue 'cease and desist orders' to twenty livestock producers due to bacterial counts that exceeded water quality standards. Part of the problem was believed to be the result of runoff from poorly designed and managed livestock waste handling practices. The primary purpose of this study was to determine the parameters that could be used for effectively treating effluent from livestock operations before discharging it into streams. The results indicate that 'salting' or increasing the salinity of the effluent is an effective means of reducing the bacterial population of the liquid waste. This technique, coupled with detention ponds, provides a method for controlling the quality of the runoff before it is allowed to enter shellfish areas.
W76-11334

IDENTIFICATION OF STABLE ORGANIC COMPOUNDS IN WASTE EFFLUENT,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 5A.
W76-11338

BIOLOGICAL PURIFICATION OF HIGHLY CONCENTRATED SPENT SODIUM SULFITE PULPING LIQUORS (ETUDE DE L'EPURATION BIOLOGIQUE DE LESSIVES RESIDUAIRES AU SULFITE DE SODIUM DE FORTE CONCENTRATION),
Grenoble University, Grenoble, France.
J. Quiles-Mottiaux.
Ph.D. Thesis, 1971, 116 p, 36 plates. 24 fig, 49 ref, 23 tab.

Descriptors: *Sulfite liquors, *Pulp wastes, *Biological treatment, *Waste water treatment, Wastes, Industrial wastes, Aeration, Waste treatment, Temperature, Hydrogen ion concentration, Nutrients, Biochemical oxygen demand, Microorganisms, Chemical precipitation, Chemical degradation, Ozone, Color, Water pollution treatment, Water pollution control, Hardwood, *Chemical oxygen demand.
Identifiers: NSSC (Neutral sulfite semichemical) pulping.

Studies on the biological purification of concentrated spent liquors from the NSSC (neutral sulfite semichemical) pulping of hardwoods are reported. Following preliminary investigations on the development of microorganisms, the optimum composition of the medium, and optimum aerations conditions, temperature, pH, and nutrient additions, discontinuous biological purification tests were carried out using a tenfold spent liquor dilution, temperature of 25C, pH of 8.5, treatment period of 48 hr, and specific N, P, K, Mg, Mo, and Mn nutrient additions. The 5-day BOD of the spent liquor was found to decrease from 3500 (tenfold diluted liquor) to 650 mg/liter. This was followed, in turn, by semi-industrial continuous tests (8-fold liquor dilution, 25C, 24 hr), using a special strain capable of developing in concentrated liquor. BOD was again reduced to 650 mg/liter (86%), COD from 43,700 to 20,600 mg/liter (53%). Two methods were then examined for further reduction of COD, viz., removal of pollutants via precipitation, and chemical degradation of liquor constituents. Best results were obtained with ozone treatment. When followed by biological purification, ozone gave a BOD reduction of 98.8% and a COD reduction of 70%. Significant decoloration of the effluent was also obtained. (Speckhard-IPC)
W76-11364

THE IMPACT OF VACATION HOMES ON NATIONAL FOREST WATER RESOURCES,
Arizona State Univ., Tempe. Coll. of Engineering Sciences.
For primary bibliographic entry see Field 5G.
W76-11366

LAND TREATMENT AND DISPOSAL OF MUNICIPAL AND INDUSTRIAL WASTEWATER,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
Ann Arbor Science Publishers Inc., Ann Arbor, Michigan. 1976. 310 p. Sanks, R. L., and Asano, T. (editors).

Descriptors: *Industrial wastes, *Municipal wastes, *Waste water disposal, *Soil disposal field, Water pollution sources, Wastes, Nutrients, Agronomic crops, Groundwater recharge, Soil treatment, Treatment facilities, Conference, Publications, Regulation, Public health, Farm wastes, Infiltration, Percolation, Land management, Irrigation, Spraying, Design, Operation and maintenance, Water pollution control, Disposal, Waste disposal.

The practice of applying municipal and industrial waste waters, treated effluents, and sludges to land has received attention for over a decade. Originally thought of only as a convenient means of waste disposal, newer goals include the utilization of dissolved nutrients by agricultural crops and tertiary (or advanced) treatment of water discharges to improve stream quality of recharge falling groundwater tables. As an aid to engineers and scientists investigating, planning, or designing soil-treatment and wastewater-disposal systems, this book is an outgrowth of the proceedings of the 4th Environmental Engineers' Conference held at Montana State University. Some original contributions (by different authors) were revised and many new ones added. The 13 chapters deal with the following details: Land treatment of wastewaters -- institutional and regulatory approach; use of the soil-vegetation biosystem for wastewater recycling; treatment processes and environmental impacts of waste effluent disposal on land; acceptability of wastewater effluents by soils; public health aspects of land application of wastewater; land disposal of liquid industrial wastes; application of agricultural wastes to land; potential problems of land application of domestic wastewaters; land treatment of wastewater by infiltration-percolation; engineering investigations for land treatment and disposal; design and operation of spray irrigation facilities; and review of the Muskegon County wastewater management system. An index is appended. (Brown-IPC)
W76-11370

STATUS OF THE NPDES (NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM) IN THE SOUTHEAST,
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5G.
W76-11371

TESTING AND APPLICATION OF STATIC AERATORS,
Shell (Gerry) Environmental Engineers, Brentwood, Tenn.
G. Shell, and R. Stein.
In: TAPPI Environmental Conference, Atlanta, Georgia, April 26-28, 1976, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 45-57. 5 fig, 4 ref, 2 tab.

Descriptors: *Aeration, *Waste water treatment, Equipment, *Testing, Oxygenation, Water purification, *Operation and maintenance, Waste treatment, Water pollution treatment, Mathematical models, Waste treatment, Water quality control, Pulp and paper industry.
Identifiers: *Aerators.

Operating parameters of over 200 aeration tests completed on 7 different commercial designs of submerged static aerators were evaluated. The results indicated that the oxygen transfer rate for the various designs ranged from 5 to 20% greater than an open tube. Operating depths of 10, 15, and 20 ft were evaluated at air flow rates ranging from 20 to 70 std. cu ft/min/tube. There was no indication of flooding or loss of oxygen transfer with increased air flow. The oxygen transfer efficiency was relatively constant throughout the normal operating air flow range. The submerged static aerator is an attractive alternative aeration equipment for waste water treatment. Various methods of testing and evaluating aerators and mathematical models which have been used are discussed. (Sykes-IPC)
W76-11372

EXTENDED AERATION IN A COMBINED WASTEWATER TREATMENT PLANT,
Jordan, Jones and Goulding, Inc., Atlanta, Ga.
B. G. Turner, E. A. Clark, M. H. Poythress, and J. P. McHugh.
In: TAPPI Environmental Conference, Atlanta, Georgia, April 26-28, 1976, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 65-79. 6 fig, 3 ref, 10 tab.

Descriptors: *Waste water treatment, *Pulp wastes, *Treatment facilities, *Municipal wastes, Water pollution sources, Water pollution treatment, Water pollution control, Wastes, Waste treatment, Industrial wastes, *Georgia, Aerated lagoons, Water purification, Sludge disposal, Operation and maintenance, Water quality control, Sewage treatment, Dissolved oxygen, *Aeration.
Identifiers: Kraft mills, Board mills, Ocmulgee River(Ga), *Extended aeration, Combined treatment.

A 14 million gal/day effluent treatment plant was placed in operation in spring, 1975, to purify Georgia Kraft Co.'s 900 ton/day kraft linerboard mill discharges along with 5 million gal/day of primarily domestic wastewater from the city of Macon, Georgia. The linerboard mill has implemented steps to improve and reduce its effluent discharges. The water pollution control plant (designed after extensive pilot plant studies) operates without primary clarification and includes two aeration basins (7 million gallon capacity each), each equipped with five 125-hp mechanical aerators, and two 115-ft diameter secondary clarifiers. Waste sludge is discharged to a short-term aerated holding basin with sludge-decanting capability. A series of sludge-disposal evaluations involving pilot and bench-scale studies of various types of sludge-dewatering and disposal equipment have been conducted. Operating experience with the plant is reviewed. Certain difficulties with solids settleability have caused poorer than desired effluent characteristics, but reasonable solutions to this problem are available. Water quality on the Ocmulgee River downstream from Macon has improved. In the summer of 1975, the lowest dissolved oxygen level did not violate stream standards. Othersstream quality parameters show similar improvement. (Sykes-IPC)
W76-11373

BIOMETER MEASUREMENT OF ACTIVATED SLUDGE AT WESTVACO CORPORATION,
Westvaco Corp., Covington, Va. Covington Research Center.
O. A. Campbell, and W. D. Major.
In: TAPPI Environmental Conference, Atlanta, Georgia, April 26-28, 1976, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 122-140. 10 fig, 15 ref, 2 tab.

Descriptors: *Activated sludge, *Pulp wastes, *Waste water treatment, *Biomass, *Instrumentation, Wastes, Industrial wastes, Waste treatment, Bioluminescence, Biochemical oxygen demand, Chemical oxygen demand, Oxygen requirements, Photometry, Suspended solids, Enzymes, Water pollution treatment, Water pollution control, Analytical techniques, Virginia, Pollutant identification.
Identifiers: DuPont 760 Luminescence Biometer.

The DuPont 760 Luminescence Biometer used for this study is a sensitive photometer designed to measure bioluminescence released by the firefly luciferase-luciferin reaction. In this manner, adenosine triphosphate (ATP) enzyme, a constituent of all living cells, can be measured and related quantitatively to viable cells (biomass) in pure cultures. Objectives of the described project were to determine quantitatively the amount of viable matter in the final effluent suspended solids as well as other points in a waste treatment plant, and to investigate the feasibility of using biomass measurement as an operating parameter. An attempt was made to relate biomass to plant performance (BOD removal), COD, and oxygen uptake. The Biometer detected biomass; however, the quantitative relationship to specific numbers (colonies) or to weight of living matter is questionable in mixed cultures. Relative levels of biomass in the water treatment plant were established and were relatively consistent. Substantial dynamic changes in biomass in activated sludge, if they occur, were not detected with the Biometer in these tests. Biomass measurements do not relate to performance. (Sykes-IPC)
W76-11375

PROCESS WASTEWATER: RECLAMATION OR DISPOSAL,
Sandwell International Inc., Atlanta, Ga.
P. H. Rath.
In: TAPPI Environmental Conference, Atlanta, Georgia, April 26-28, 1976, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 109-113. 4 tab.

Descriptors: *Pulp wastes, *Biological treatment, *Water reuse, *Waste water disposal, Wastes, Industrial wastes, Waste water treatment, Water pollution sources, Water pollution control, Water pollution treatment, Activated sludge, Economics, Suspended solids, Capital costs, Treatment facilities, Legislation, Water consumption(Except consumptive use), Water conservation.
Identifiers: Kraft mills, Spills, Process waste water.

Biological treatment is the predominant means chosen by the U.S. pulp and paper industry to comply with 1977 discharge limits. Two mills (a 250 ton/day kraft pulp and paper mill producing specialty papers and a 1000 ton/day kraft pulp and paper mill producing linerboard, sack paper, and bleached market pulp) having activated sludge plants have evaluated installation of new facilities for spill collection, foul condensate treatment, and waste water volume reduction. The economic justification for these in-plant changes is summarized. The impact of proposed 1983 discharge limits on existing mills is summarized with reference to in-plant conditions and reuse potential of treated wastewater. In-plant reduction of wastewater volume is beneficial in reducing total effluent suspended solids, lowering capital cost of new treatment facilities, and providing production cost savings, and is essential for stable operation of an activated sludge plant. Treated effluent reuse potential for most integrated mills is in the range of 5 to 20% of total mill water requirements. Additional treatment to the 1983 discharge compliance level will not significantly increase the suitability of final effluent for reuse. Most existing mills will be forced to install additional external treatment facilities to meet 1983 discharge limits. Expenditures for such external treatment facilities can be minimized by reducing process water consumption. (Sykes-IPC)
W76-11376

CHESAPEAKE CORPORATION OPERATING EXPERIENCE WITH A HIGH PURITY OXYGEN ACTIVATED SLUDGE WASTE TREATMENT SYSTEM,
Chesapeake Corp. of Virginia, West Point.
K. R. Gilbreath.
In: TAPPI Environmental Conference, Atlanta, Georgia, April 26-28, 1976, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 141-144. 1 fig, 2 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Activated sludge, *Oxygen, Wastes, Industrial wastes, Waste treatment, Water pollution sources, Water pollution treatment, Water pollution control, Virginia, Treatment facilities, Water purification, Biochemical oxygen demand, Microorganisms, Suspended solids, Biological treatment, Operation and maintenance, Virginia.
Identifiers: Kraft mills, UNOX process.

Chesapeake Corporation (West Point, Virginia) has operated a high-purity oxygen activated sludge treatment system on kraft mill effluent since May 1974. The wastewater treatment facility consists of a single primary clarifier, a three-cell cooling tower, a three-stage UNOX oxygen activated sludge basin, two secondary clarifiers, a sludge thickener-clarifier, and two coil-spring vacuum filters. With such a system, high BOD-removal efficiency is maintained even when filamentous organisms are present. Abrupt changes in the influent wastewater characteristics only slightly affected the effluent's 5-day BOD. Effluent total suspended solids concentration was more susceptible to fluctuation in the influent wastewater characteristics. The presence of filamentous organisms raises the effluent total suspended solids concentration and makes the system more susceptible to upsets. The biological system averaged 92-94% removal of BOD with an average effluent concentration of 30 mg/liter without filamentous organisms present and 90-94% BOD removal with an average effluent concentration of 32 mg/liter with filamentous organisms present. The effluent total suspended solids averaged 40 mg/liter without organisms and 75 mg/liter with organisms present. Settling characteristics of the biological organisms also deteriorated with filamentous organisms present as noted by an increase in the sludge volume index from 50 to 90 and by a decrease in the initial settling velocity from 5.5 to 3.5 ft/hr. (Sykes-IPC)
W76-11377

RESEARCH ON THE MECHANISMS FOR REMOVAL OF SOLUBLE BOD(5) IN CLARIFIER SYSTEMS,
Institute of Paper Chemistry, Appleton, Wis.
G. A. Dubey, A. J. Wiley, and J. W. Collins.
In: TAPPI Environmental Conference, Atlanta, Georgia, April 26-28, 1976, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 145-155. 4 fig, 10 ref, 16 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Biochemical oxygen demand, *Water purification, Wastes, Industrial wastes, Waste treatment, Water pollution sources, Water pollution treatment, Water pollution control, Iron compounds, Hydrogen ion concentration, Solubility, Flocculation, Costs, Chemical precipitation, Laboratory tests, Chromatography, Water pollution, Water quality.
Identifiers: Ferric chloride, Aluminum sulfate, *BOD5.

Primary clarifiers used for the treatment of wastes from the pulp and paper industry vary widely in the amount of 5-day BOD they remove. In a survey of effluents from 19 pulp and paper mills (9 with clarifiers), it was found that a large part of the 5-day BOD was due to soluble materials. Analyses of effluent from mills having clarifiers indicated a large proportion of 5-day BOD remaining in the discharge streams was also due to soluble components. The soluble 5-day BOD was markedly reduced in a number of mill effluents with ferric chloride and alum under carefully controlled laboratory conditions. Gel chromatographic studies with mill effluents before and after clarification and work done with model compounds in pure solution showed that the soluble 5-day BOD components which were removed could be both high- and low- molecular weight compounds. The removal is apparently related to the pH of the solution and to the functional groups (hydroxyl, phenol, or carboxyl), chain length, branching, and solubility of the compounds. Decreased costs and increased operating efficiency in the primary clarifiers using flocculating agents to remove 5-day BOD depends on the reduction, elimination and/or separate treatment of streams which are detrimental to the system. (Sykes-IPC)
W76-11378

BOARD MILL WASTEWATER TREATMENT SYSTEM WITH COUNTERCURRENT DISSOLVED AIR FLOTATION THICKENING AND VACUUM FILTER DEWATERING,
Ingersoll-Rand Co., Nashua, N.H.
J. T. Albert, and A. R. Taylor.
In: TAPPI Environmental Conference, Atlanta, Georgia, April 26-28, 1976. Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 197-199. 1 fig, 2 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Flotation, *Filtration, Wastes, Industrial wastes, Waste treatment, Water pollution sources, Water pollution treatment, Water pollution control, Biochemical oxygen demand, Suspended solids, New Hampshire, Treatment facilities, Equipment, Sewage treatment, Dewatering, Filters.
Identifiers: Board mills, Hoague-Sprague Boxboard Mill(West Haven N.H.).

A newly developed countercurrent flotation separation (CFS) and a traveling-belt vacuum filtration system proved to be an effective method to treat board mill wastewater at the Hoague-Sprague Boxboard Mill in West Haven, New Hampshire. The CFS unit reduces the influent suspended solids ranging from 990-3758 mg/liter to 24-93 mg/liter (92-98% removal) and the 5-day BOD by 25-43%, resulting in an effluent BOD of 649-2067 mg/liter. The effluent BOD is reduced further by secondary treatment. Floated solids are concentrated to 6.4-9.3% and dewatered by the traveling-belt vacuum filter at 4.2-5.2 lb/sq ft/hr loading rate. The dry solids in the filter cake range between 19.3 and 22.3%. (Sykes-IPC)
W76-11380

UNOX SECONDARY SLUDGE DEWATERING STUDIES AT LONGVIEW FIBRE COMPANY,
Longview Fibre Co., Wash.
J. E. Goodwin.
In: TAPPI Environmental Conference, Atlanta, Georgia, April 26-28, 1976, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 221-224. 9 tab.

Descriptors: *Sludge treatment, *Pulp wastes, *Dewatering, Wastes, Industrial wastes, *Waste water treatment, Water pollution sources, Water pollution treatment, Sludge disposal, Incineration, Equipment, Centrifugation, Filters, Aerobic treatment, Drying, Solid wastes, Water pollution control, Washington.
Identifiers: Tate-Andritz belt press, UNOX process.

A secondary sludge-dewatering system was initiated at Longview Fibre Company (Longview, Washington) in conjunction with a UNOX secondary treatment system. Sludge disposal via injection into the lime mud vacuum filters or the centrifuges, and via dewatering and incineration were investigated. Equipment evaluated during the dewatering studies included basket centrifuges, solid-bowl centrifuges, coil filters, pressure filters, belt presses, drying beds, gravity thickeners, and aerobic digesters. Results of the study indicated injection of the sludge into the mill system was not feasible. The injection of dilute secondary sludge into the lime mud system decreased the cake solids delivered to the kilns, necessitating the use of greater quantities of fuel. Of the dewatering devices tested, the Tate-Andritz twin-wire belt press gave the most reliable operation with acceptable solids yield. (Sykes-IPC)
W76-11381

HANDLING AND DISPOSAL OF BLEACH PLANT EFFLUENTS,
Longview Fibre Co., Wash.
R. G. Elliott, F. Howard, M. Gould, S. Rock, and T. Farr.
In: TAPPI Alkaline Pulping Conference, Williamsburg, Virginia, October 27-29, 1975, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 37-40.

Descriptors: *Bleaching wastes, *Waste water treatment, *Pulp and paper industry, Lime, Hydrogen ion concentration, Color, Biochemical oxygen demand, Ion exchange, Resins, Wastes, Industrial wastes, Water pollution sources, Water pollution treatment, Water pollution control, Waste disposal, Chemical recovery, Effluents, Waste treatment.
Identifiers: Amberlite, Alkaline extraction, Kraft mills.

This transcript of the Bleaching Round Table presented at the 1974 TAPPI Alkaline Pulping Conference (Seattle, Washington), discusses the use of lime or lime mud for effluent pH control, lime treatment for effluent color and BOD reduction, use of polymeric absorbents (such as Amberlite XAD-8 resin) for reducing effluent color and BOD, and incorporation of caustic extraction effluent into kraft chemical recovery. (Witt-IPC)
W76-11383

WET AIR OXIDATION AT ONTONAGON,
Hoerner Waldorf Corp., Ontonagon, Mich.
J. E. Hoeft, and C. L. Soukup.
In: TAPPI Alkaline Pulping Conference, Williamsburg, Virginia, October 27-29, 1975, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 37-40. 1 fig.

Descriptors: *Pulp wastes, *Waste water treatment, *Oxidation, Wastes, Industrial wastes, Water pollution sources, Water pollution treatment, Michigan, Municipal wastes, Treatment facilities, Electric power, Water pollution control, Waste treatment, Aeration.
Identifiers: *Wet air oxidation, Semichemical pulp mills, Chemical recovery, Corrugating medium, Compressed air.

Faced with the dual problem of complying with stringent new air and water pollution standards, and the need to increase productivity to make such compliance economically feasible, Hoerner Waldorf Corporation opted for a unique semichemical pulping, recovery, and waste treatment system at its Ontonagon, Michigan, paper mill. The Zimpro wet air oxidation system replaced the existing recovery furnace which did not meet environmental standards of the state of Michigan. The system is based on the scientific principle that organic material in aqueous solution can be oxidized to carbon dioxide and water by air, under pressure, and at temperatures of 350-700F. The system recovers pulping chemicals, generating energy during the process, and treats both mill effluent and municipal sewage from the village of Ontonagon. The cost of these environmetal improvements made it necessary for the company to add a second paper machine. The mill produces corrugating medium. (Witt-IPC)
W76-11384

WATER REUSE AND RECYCLE IN THE C(D)EHDED BLEACH SEQUENCE,
CIP Research Ltd., Hawkesbury (Ontario).
For primary bibliographic entry see Field 3E.
W76-11385

CLARIFIERS WITH SUSPENDED SEDIMENT LAYER FOR THE PURIFICATION OF EFFLUENTS (OSVETLITELI SO VZVESHENNYM SLOEM OSADKA DLYA OCHISTKI STOCHNYKH VOD),
Vsesoyuznyi Nauchnyi Planovii Otdel Bumazhnoi Promyshlennost Moscow (USSR).

G. A. Romanov, G. P. Kuchin, and Yu. M. Smirnov.
Bumazhnaya Promyshlennost, No. 2, p 22-23, February, 1976. 1 fig, 1 tab.

Descriptors: *Water purification, *Pulp and paper industry, Equipment, Wastes, Industrial wastes, Waste treatment, *Waste water treatment, Water pollution treatment, Water pollution sources, Settling basins, Effluents, Water pollution control, Suspended solids, Water reuse.
Identifiers: Clarifiers.

Clarifiers with suspended filtering layers are successfully used for the purification of natural waters, effluents from viscose rayon factories, and in other branches of industry. A clarifier based on the same principle, specifically designed for paper industry effluent containing fibers and fillers, is described. The purification effect, as shown by laboratory and pilot plant tests is 96-99%, so that the clarified effluent can be recycled. The sediment is suitable for reuse in the manufacture of low-grade papers and boards. The residual solids content in the clarified effluent does not exceed 10-15 mg/liter. Clarifiers of this type have been introduced at two board mills, giving a purification of 96-97% for fibers and 80-85% for kaolin. Larger clarifiers, i.e., 20 m in diameter with a capacity of 1200-1300 cu m/hr, are under development. (Stapinski-IPC)
W76-11388

METHOD OF CONTROLLING THE PROCESS OF CHEMICAL PURIFICATION OF EFFLUENTS (SPOSOB OPERATAIVNOGO UPRAVLENIYA PROTSESSOM KHIMICHESKOI OCHISTKI STOCHNYKH VOD),
Vsesoyuznyi Nauchnyi Planovyi Otdel Bumazhnoi Promyshlennost, Moscow (USSR).
I. G. Alesina, M. M. Krunchak, V. P. Semenov, V. Z. Ponizovskii, and A. F. Milagin.
Bumazhnaya Promyshlennost, No. 1, p 22-23, January, 1976. 1 fig, 1 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Water purification, *Coagulation, Wastes, Industrial wastes, Water pollution treatment, Water pollution sources, Alkalinity, Color, Hydrolysis, Hydrogen ion concentration, Neutralization, Waste treatment, Chemical precipitation, Sorption, Statistical methods.
Identifiers: Aluminum sulfate, Sulfuric acid, Aluminum hydroxide, Kraft mills.

Chemical purification of kraft mill effluent with aluminum sulfate, which involves the sorption of pollutants on aluminum hydroxide, requires a sufficient alkalinity in the effluent for the formation of the sorbent (aluminum hydroxide). Therefore, correlations between the dose of coagulant and both the alkalinity and color of the effluent were investigated. Mill practice shows that in many cases the alkalinity of the effluent is higher than necessary for hydrolysis of the amount of aluminum sulfate needed, and an excess must be used to obtain the optimum pH for coagulation. In such cases, the amount of aluminum sulfate can be reduced by partially neutralizing the effluent with sulfuric acid. Based on experimental data and their statistical analysis, functional relations were derived (1) between the dose of coagulant and alkalinity (for practical purposes the dose equals alkalinity), (2) between the optimum dose after the maximum possible reduction of alkalinity, and (3) between the amount of sulfuric acid which can be added to the alkalinity and color of the effluent. The use of these relations will eliminate time-consuming coagulation tests to determine the needed dose of coagulant. (Stapinski-IPC)
W76-11389

INTENSIFICATION OF BIOLOGICAL PURIFICATION OF EFFLUENTS (INTENSIFIKATSIYA BIOLOGICHESKOI OCHISTKI STOKOV),
I. S. Levit, S. F. Bin'kovskii, A. I. Zatsepilin, G. S. Burin, and M. A. Evilevich.
Bumazhnaya Promyshlennost, No. 2, p 21, February, 1976. 1 tab.

Descriptors: *Biological treatment, *Waste water treatment, *Pulp wastes, Wastes, Industrial wastes, Water pollution sources, Water pollution treatment, Water pollution control, Activated sludge, Settling basins, Aeration, Sludge, Water purification, Biochemical oxygen demand, Costs, Effluents, Water quality control, Waste treatment.
Identifiers: USSR.

One of the newest methods of intensification of effluent purification, the biosorption method, has been recently introduced at the Bratsk woodprocessing complex (Siberia). This method consists in adding the excess activated sludge to the effluent in the primary sedimentation tank, aerating the mixture for a short time, and separating the sediment along with the sludge. Studies of this process have shown that in the presence of activated sludge (in an amount considerably smaller than in the aeration tank) and aeration (for about 3 hr) the degree of effluent clarification increasess by 20%, and its BOD is reduced by about 30%. This increases the degree of biological purification in the aeration tanks from 94.5 to 97.5%. At the same time the process increases the capacity of the purification equipment (in terms of BOD) by 12.4% and reduces the cost of purification. The method is particularly well suited for highly polluted effluents. (Stapinski-IPC)
W76-11391

IMPROVED SYSTEM FOR THE PURIFICATION OF WASTE WATERS AT THE LVOV BOARD MILL (UDOSKONALENA SKHEMA OCHISTKI STICHNIKH VOD NA 1'VIVS'KIIKARTONI FABRITSI,
B. M. Stelmakh.
Lisova Gospodarstvo, Lisova Paperova, Derevoobrobna Promislovist, Vol. 6, p 21-22, 1974. 1 fig.

Descriptors: *Water reuse, *Waste water treatment, *Pulp wastes, Wastes, Industrial wastes, Water pollution sources, Water pollution treatment, Water pollution control, Waste treatment, Water purification, Recycling, Suspended solids, Hydrogen ion concentration, Chemical oxygen demand, Foreign countries, Industrial water, Chemical precipitation, Water conservation, Europe.
Identifiers: *White water(Paper machines), Aluminum sulfate, Polyacrylamide, Ukraine, Board mills, Fiber recovery, Closed systems, Waco filters, USSR.

The Ukrainian board mill in Lvov produces 31,000 tons of boxboard annually on two cylinder mold machines. The mill is experiencing a shortage of process water, as its sources are artesian wells, and is faced with the necessity of introducing a closed water cycle. The first step in this direction was an improvement in the waste water treatment system to increase its degree of purification (which up to now was only 40-50%). This system is described and illustrated with a diagram. The fibers recovered from two Waco filters are reused in stock preparation. The partially clarified white water goes to two vertical sedimentation tanks where it is treated with aluminum sulfate and polyacrylamide. The degree of purification is presently 90%. The amount of aluminum sulfate added is 240 g/liter, the amount of polyacrylamide 10 g/liter. The purified white water, which can be recycled, contains 58 mg of suspended solids/liter, has a pH of 6.5, a COD of 192 mg/liter, and a permanganate oxidizability of 150 mg/liter. It is used for washing felts and cylinder mold wires. (Stapinski-IPC)
W76-11392

A CHEMICAL-BIOLOGICAL TREATMENT PROCESS FOR CELLULOSE NITRATE DISPOSAL,
Army Natick Development Center, Natick, Mass.
T. M. Wendt, and A. M. Kaplan.
Journal Water Pollution Control Federation, Vol. 48, No. 4, p 660-668, April, 1976. 2 fig, 24 ref, 3 tab.

Descriptors: *Biological treatment, *Waste water treatment, *Chemical degradation, Water pollution sources, Industrial wastes, Anaerobic digestion, Denitrification, Aerobic treatment, Activated sludge, *Nitrates, Biochemical oxygen demand, Carbon, Chemical oxygen demand, *Waste disposal, Water pollution control, Alkalis(Bases).
Identifiers: *Cellulose nitrate, Sodium hydroxide.

A newly developed means of disposing of cellulose nitrate involves chemical pretreatment of the biologically stable cellulose nitrate polymer, using an alkali (e.g., NaOH), followed by biological treatment. The biological treatment process consists of sequential anaerobic denitrification and aerobic activated sludge treatment steps. This continuous process reduces to nitrogen gas more than 95% of the nitrate produced during alkali digestion of cellulose nitrate and nitrate produced by nitrification in the aerobic portion of the process. Five-day BOD, total organic carbon, and COD removals averaged 88.6, 54.5, and 55.2%, respectively. The process provides an environmentally acceptable alternative to more common physical means of disposal such as open burning. (Witt-IPC)
W76-11395

POLLUTION MANAGEMENT IN THE PAPER AND PAPERBOARD INDUSTRY.
For primary bibliographic entry see Field 5G.
W76-11400

PROCESS FOR SEPARATING LIQUIDS FROM SUSPENSIONS,
Department of the Interior, Washington, D. C. Office of the Secretary. (Assignee).
L. W. Brandt.
U.S. Patent No. 3,956,116, 5 p, 3 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 946, No 2, p 728, May 11, 1976.

Descriptors: *Patents, *Waste water treatment, *Phosphates, *Water pollution sources, *Slime, Suspension, Suspended solids, Separation techniques, Water purification, Settling basins, Equipment, Screens.
Identifiers: Phosphate mining.

This invention relates to a process for accelerating the separation of liquid from solids in a very slow-settling suspension or a slime, by means of a single mechanical operation which effects the compaction of the solids in a relatively short period of time. The process involves the movement of a relatively large mesh screen or net through the suspension at a slow steady rate with the result that the solid material is concentrated or compacted ahead of the moving screen leaving a clarified liquid behind the moving screen. In some instances, there may be a flocculant material employed as an aid in agglomerating the ultrafine solids. It is an object of this invention to provide a rapid method for separating liquid from solids in very slow-settling suspension without the necessity of employing chemical additives or using centrifuges or filters and to provide an improved process for treating phosphate slime to recover clarified water and concentrated minerals. (Sinha-OEIS)
W76-11448

CATIONIC POLYMERS FOR BREAKING OIL-IN-WATER EMULSIONS,
Nalco Chemical Co., Oak Brook, Ill. (Assignee).
R. L. Bradley, A. J. Sadowski, and E. G. Ballweber.

U.S. Patent No. 3,956,117, 4 p, 4 ref; Official Gazette of the United States Patent Office, Vol 946, No 2, p 728, May 11, 1976.

Descriptors: *Patents, *Industrial wastes, *Oil pollution, *Oily water, Water pollution treatment, Water pollution control, Water quality control, *Emulsions, Dispersion, Polymers, Flocculation, Separation techniques.
Identifiers: Oil-in-water emulsions.

A method has been discovered for resolving oil-in-water emulsions through the treatment of these emulsions with a water-soluble condensation copolymer of 1,4-dichloro-2-butene and a lower aliphatic secondary amine. Dispersing this water-soluble copolymer within the emulsion causes the emulsion to break and separate into an aqueous phase and an oil phase. The oil phase may then be removed by conventional methods. In one embodiment of the invention the addition and mixing of the water-soluble copolymer is followed by the addition and dispersal of one or more flocculants. The additional flocculants encourage rapid agglomeration of the flocs and thereby facilitate removal of the oil. (Sinha-OEIS)
W76-11449

FLOCCULATION PROCESS,
Mobil Oil Corp., New York. (Assignee).
J. C. Davidtz.
U.S. Patent No. 3,956,119, 6 p, 4 ref; Official Gazette of the United States Patent Office, Vol 946, No 2, p 729, May 11, 1976.

Descriptors: *Patents, *Waste disposal, *Phosphates, *Water pollution sources, *Flocculation, *Slime, Dewatering, Topsoil, Organic matter, Sludge disposal, Water reuse, Landfills, Settling basins.
Identifiers: Phosphate mining.

The dilute clay-containing slimes waste, formed in the hydraulic mining of phosphate mineral, is flocculated by mixing with an aqueous extract of fertile topsoil or with fertile topsoil which is the uppermost two feet or more of overburden that contains at least 200 parts per million organic matter extractable by water. Water is recovered from the flocculated mixture. The dewatered floc is preferably disposed at a land reclamation site and covered with overburden to restore the oridinal stable soil profile, i.e. an upper layer of soil with good drainage and a lower layer having poor drainage. One manner of utilizing the flocculated mixture of this invention is to store it in a quiescent state, i.e., without deliberate agitation other than that caused by wind, for a period of from 24 hours to about one month, in a pond or settling area. During such storage very effective sedimentation will occur with the copious formation of supernatant clear water than can be separated and returned for use in the mining process, or discharged to a river. (Sinha-OEIS)
W76-11451

PROCESS FOR THE PRECIPITATION OF HEAVY METAL ION-POLYCARBOXYLATE COMPLEXES,
Deutsche Gold- und Silber-Scheideanstalt A. G., Frankfurt-am-Main (West Germany).
H. Haschke, H. Knorre, G. Morlock, and G. Pohl.
U.S. Patent No. 3,956,121, 6 p, 4 ref; Official Gazette of the United States Patent Office, Vol 946, No 2, p 729-730, May 11, 1976.

Descriptors: *Patents, *Industrial wastes, *Water pollution treatment, Water pollution control, Water quality control, *Heavy metals, *Water pollution sources, Chemical wastes, *Chemical precipitation, Separation techniques.
Identifiers: Metal processing industry, Galvanizing.

This invention provides a process for the precipitation of heavy metal ion-poly-carboxylate complexes from their aqueous solutions. The process comprises first adding an aqueous solution of a water soluble aluminum salt, the anion of which does not form water soluble complexes with the metal ions to be precipitated or possibly such anion-heavy metal complexes having a stability constant of less than 2, expressed as its decadic (decimal)logarithm; to a solution containing the heavy metal ion-polycarboxylate complexes in such an amount that about 0.9 to 1,8 moles of aluminum ions are provided for each equivalent of the polycarboxylate. Subsequently, the pH is adjusted to about 6.5 to about 9.0. Both the complexing agents as well as the heavy metal ions are practically precipitated quantitatively. By the addition of the aluminum salt solution, the polycarboxylate-heavy metal ion-complexes are 're-complexed' to aluminum complexes. At the same time, the heavy metal ions liberated from the original complexes are precipitated as hydroxides or carbonates which are difficult to solubilize. The amorphous, voluminous aluminum complex possibly increases at the same time the quantitative separation of the heavy metals ions by producing an occluding effect. (Sinha-OEIS)
W76-11452

APPARATUS FOR DISPOSING OF ORGANIC WASTE MATERIALS,
For primary bibliographic entry see Field 5E.
W76-11455

UNDERDRAIN FOR WATER FILTRATION SYSTEM,
Hi-Ran Ltd., Charlotte, N. C. (Assignee).
For primary bibliographic entry see Field 5F.
W76-11458

PROCEEDINGS TENTH BIENNIAL CONFERENCE ON GROUND WATER, TOTAL WATER MANAGEMENT FOR CALIFORNIA'S LONG-RANGE NEEDS.
California State Dept. of Water Resources, Scramento.
For primary bibliographic entry see Field 4B.
W76-11491

AUXILIARY AGENTS USED IN TEXTILE FINISHING AS NEW COAGULANTS FOR EFFLUENTS (SRODKI POMOCNICZE STOSOWANE W WYKONCZALNICTWIE JAKO NOWE KOAGULANTY SCIEKOW PRZEMYSLU WLOKIENNICZEGO),
Centralne Laboratorium Dziewiarstwa (Poland).
J. Rouba.
Przeglad Wlokienniczy, Vol. 30, No. 1, p 46-48, January, 1976. 4 ref, 2 tab.

Descriptors: *Coagulation, *Waste water treatment, *Textiles, Wastes, Industrial wastes, Water pollution sources, Cations, Organic compounds, Foreign countries, Dyes, Water purification, Water pollution treatment, Water pollution control, Color, Biochemical oxygen demand, Separation techniques, Waste treatment.
Identifiers: Sedipur KA, Zabulen EP, Marwellan SF, Pilasol W, Direct dyes, Reactive dyes, *Poland, IS fixative.

Positive results obtained in coagulation of textile industry effluents with organic cationic compounds, such as Sedipur KA, prompted a search for more readily available domestic Polish coagulants. Some textile-finishing auxiliaries are cationic compounds. Preliminary experiments with two such agents produced in East Germany, Zabulen EP and Marwellan SF, gave encouraging results. These experiments were continued with a number of Polish additives. They were conducted on two types of concentrated cotton-dyeing effluents from the use of direct dyes and reactive dyes, respectively. Two agents, viz., Pilasol W and the fixative IS, gave good results with effluent containing direct dyes (complete decoloration, clarification, and considerable reduction of BOD). Only the fixative IS was effective in the case of effluent containing reactive dyes. (Stapinski-IPC)
W76-11501

COAGULATION OF TEXTILE INDUSTRY EFFLUENTS WITH FIXATIVE 'IS' (PROBY KOAGULACJI SCIEKOW PRZEMYSLU WLOKIENNICZEGO UTRWALACZEM IS),
Centralne Laboratorium Dziewiarstwa (Poland).
J. Rouba.
Przeglad Wlokienniczy, Vol. 30, No. 2, p 94-96, February, 1976. 1 fig, 3 ref, 4 tab.

Descriptors: *Coagulation, *Waste water treatment, *Textiles, Europe, Wastes, Waste treatment, Industrial wastes, Water pollution sources, Water pollution treatment, Water pollution control, Color, Biochemical oxygen demand, Suspended solids, Surfactants, Cations, Organic compounds, Separation techniques, Sedimentation, Flotation, Water purification, Costs, Storage, Corrosion, Foreign countries.
Identifiers: *IS fixative, *Poland.

An earlier study of effluent coagulation with cationic compounds used in textile finishing showed that the fixative IS is the most effective. This agent is a condensation production of dicyandiamide with formaldehyde, and is produced at the Nitrogen Chemical plant in Kedzierzyn (Poland). When used for coagulation of total effluents from cotton-processing mills, it achieved complete decoloration, 50% BOD reduction, and 90% removal of suspended solids and anionic surfactants. Compared to inorganic coagulants, the cationic organic agents have the disadvantage of slow sedimentation and more difficult separation of the sediments. Laboratory experiments indicated that a faster and more convenient method of separation is pressure flotation. In about 15 minutes a good separation of the sediment from the coagulated effluent was obtained. The volume of the sediment was 3.8% of the coagulated effluent volume and its water content was 97.7%. Such sediments can be dewatered and then burned. Compared to inorganic coagulants, the cationic agents have the advantages of requiring a smaller dose, eliminating the introduction of water hardness salts into the purified effluent, and of lowering the costs of purification considerably. The IS fixative can be stored for at least one year and is noncorrosive. (Stapinski-IPC)
W76-11502

FLOCCULATION OF WASTEWATER WITH POLYELECTROLYTES AND FERRIC CHLORIDE,
Arizona Univ., Tucson. Dept. of Civil Engineering and Engineering Mechanics.
C. D. Walding.
Ph.D. Dissertation, 1975. 69 p, 3 tab, 20 fig, 24 ref.

Descriptors: *Flocculation, *Waste water treatment, *Polyelectrolytes, *Chlorides, Economic feasibility, Suspended solids, Polymers, Anions, Cations, Settling velocity, Chemicals, Testing, Costs.
Identifiers: *Ferric chloride.

Raw municipal wastewater can be efficiently and economically flocculated with polyelectrolytes and ferric chloride. Chemical and physical process variables which affect flocculation were studied, including flocculant types and dosages, suspended solids concentrations, chemical addition sequences and mixing intensities. Anionic polymers used following ferric chloride were more effective than cationic or nonionic types at equivalent dosages. The combined chemical system increases floc settling rates beyond those observed when using no chemicals or ferric chloride alone. Capital savings from more rapid settling rates can offset much of the cost of the chemicals. Experimental results are given for single and double flocculant systems, and cost op-

timization is discussed. A bench scale modified jar test was developed to improve sensitivity to initial settling rates. (Jahns-Arizona)
W76-11520

REMOVAL OF HYDROGEN SULFIDE FROM DRINKING AND INDUSTRIAL WATER, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Moscow (USSR).
For primary bibliographic entry see Field 5F.
W76-11541

EXPERIENCE IN THE TREATMENT OF HIGHLY-CONCENTRATED SPENT NATIVE SOLUTION OF BENZYL PENICILLIN, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Antibiotikov, Moscow (USSR).
V. F. Karpukhin, and S. V. Mosiichuk.
Khim-Farm Zh. 8(12), p 46-48, 1974.

Descriptors: Chemical oxygen demand, *Aeration, Oxidation lagoon, Activated sludge, Protozoa, Aerobic conditions, *Waste water treatment.
Identifiers: *Benzyl penicillin, Aeration tanks.

Treatment of spent native solution of benzyl penicillin, having a chemical oxygen demand of 40,000 mg/liter, was possible in aeration tanks without dilution. The species composition of protozoa indicated a good state of the activated sludge. Certain wastewater from the production of other antibiotics can be treated by the aerobic biochemical method.--Copyright 1975, Biological Abstracts, Inc.
W76-11543

STUDY OF THE EFFECT OF WATER DESALINATED BY ELECTRODIALYSIS ON SOME BIOLOGICAL OBJECTS, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Selskoi Gigieny, Saratov (Gigieny).
A. A. Orlov.
Gig Sanit. 6, p 90-92, 1974.

Descriptors: *Desalination, *Electrodialysis, Daphnia, Potable water, Desalination plants, Waste water treatment, Water supply.
Identifiers: Daphnia-Magna, *Activated charcoal.

Studies with Daphnia magnus and white rats showed that water desalinated in the EOUNIIPM-25 and EKhO-15-4P industrial desalination plants under natural conditions with additional treatment by activated birch charcoal contains no toxic substances, is harmless and can be used for drinking. The activated charcoal filter is mandatory in electrodialysis desalting plants.--Copyright 1975, Biological Abstracts, Inc.
W76-11548

WICHITA FALLS INTEGRATED MUNICIPAL INFORMATION SYSTEM, WATER UTILITY PROCESSING SYSTEM (WUPS), APPLICATION COMPLETION REPORT, VOLUME I.
For primary bibliographic entry see Field 3D.
W76-11596

WICHITA FALLS INTEGRATED MUNICIPAL INFORMATION SYSTEM, WATER UTILITY PROCESSING SYSTEM (WUPS), APPLICATION COMPLETION REPORT, VOLUME II.
For primary bibliographic entry see Field 3D.
W76-11597

IDENTIFICATION OF ORGANIC COMPOUNDS IN EFFLUENTS FROM INDUSTRIAL SOURCES,
Versar, Inc., Springfield, Va. General Technologies Div.
For primary bibliographic entry see Field 5A.
W76-11598

URBAN STORMWATER MANAGEMENT MODELING AND DECISION-MAKING,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
J. P. Heaney, W. C. Huber, H. Sheikh, M. A. Medina, and J. Doyle.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-242 290, $7.50 in paper copy, $3.00 in microfiche. Report EPA-670/2-75-022, May, 1975. 185 p, 37 fig, 47 tab, 92 ref.

Descriptors: *Decision making, *Model studies, *Rainfall, Runoff, *Waste water treatment, Erosion control, Water storage, Vegetation, Optimization, Cost analysis, Storm drains, Combined sewers, Water pollution, Computer programs, Streams, Storm water, Urban runoff, Cities, Urbanization.
Identifiers: Stream pollution, Storm Water Management Model (SWMM).

The Environmental Protection Agency (EPA) Storm Water Management Model (SWMM) was tested, refined, and augmented to develop decision-making techniques for studying runoff problems. The refinements include incorporating a sediment prediction capability using the Universal Soil Loss Equation. Other refinements reflect recent developments such as swirl concentrators. The model was tested in Lancaster, Pennsylvania. Agreement between predicted and measured hydrographs and pollutographs was only fair, due to the very limited and somewhat questionable quality and quality verification data available. Quality predictions and the limited measured data available were reasonably close for the Conestoga River, the receiving waterway. The refined and augmented model showed an improved capability to describe the various processes. The decision-making model examines stormwater management in the general context of water resources management. It indicates that urbanization results in significantly higher peak flows and substantially increased control costs. Interrelationships with flood control and drainage, street and parking lot design, and air pollution are included. Impervious areas associated with the automobile appear to be the most important source of stormwater problems. More efficient use of paved areas appears to reduce the problem. An optimization procedure for control strategies uses linear programming techniques and procedures from cooperative N-person game theory. The SWMM was also applied to preliminary hydraulic design of sewer systems. The runoff portion provided a more accurate inlet hydrograph. The transport portion analyzed the hydraulics of flow through sewers, including a routine that checks for surcharging. (Snyder-FIRL)
W76-11599

WATER QUALITY MANAGEMENT PLANNING FOR URBAN RUNOFF.
Environmental Protection Agency, Washington, D. C.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 689, $8.00 in paper copy, $3.00 in microfiche. Report EPA-440/9-75-004, December, 1974. 214 p, 36 fig, 38 tab, 160 ref, 4 append.

Descriptors: *Waste water treatment, Analytical techniques, *Water pollution, *Water quality, *Urban runoff, Storm runoff, Runoff forecasting, Snowmelt, Storms, Surface waters, *Planning, Cities, *City planning.
Identifiers: Surface water runoff, Urban planning.

Technical assistance is provided to state and local water quality management planners for identifying and characterizing urban runoff as a non-point source of water pollution without extensive data generation. Preliminary evaluation of cost effective abatement and control practices is also discussed. The analytical procedures are identified according to three levels, requiring increasingly more effort and yielding correspondingly higher degrees of accuracy. The characterization is limited to runoff from impervious surfaces, which is the predominant source of pollutants associated with urban stormwater. Analytical procedures to predict the quality, quantity, and rate of runoff from specified storm events are included. Examples illustrate these analytical methods and procedures. Runoff from sources such as urban irrigation and snowmelt is also included. General criteria for evaluating the water pollution potential of urban runoff, as well as methods for treatment, abatement, and ultimate disposal are discussed. Background information is provided, emphasizing recent studies. (Snyder-FIRL)
W76-11600

MERCURY IN LAUNDRY WASTEWATERS,
Illinois Inst. for Environmental Quality, Chicago.
J. W. Patterson.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 602, $4.50 in paper copy, $3.00 in microfiche. ILEQ Doc. No. 75-10, February, 1975. 45 p, 22 tab, 106 ref.

Descriptors: *Waste water treatment, *Mercury, *Laundering, *Waste water(Pollution), *Pollution abatement, Detergents, Fabrics, Chemicals, Adsorption, Activated carbon, Standards, Filtration.

Results of a study directed toward identifying sources of mercury in laundry are described, and the capability and technological feasibility of available mercury abatement procedures for laundry wastes are assessed. Perhaps half or more of the mercury in laundry waste water was removed from soiled fabrics during laundering. The other major source of mercury in laundry waste water is mercury contaminated laundering chemicals. Significant mercury content was indicated for caustic, hydroflurosilicic acid, bacteriostats and mildicides, and various soaps and fabric softeners which frequently contain bacteriostatic agents. Iron and calcium chloride coagulation and activated carbon adsorption have the capability to treat effluent to meet the Illinois effluent standard of 0.5 microgram/liter. Only activated carbon, however, would consistently achieve an effluent value below the Illinois standard for the mercury levels in commercial laundry waste water. It has been shown to reduce mercury levels to below 0.25 micrograms/liter on a commercial laundry waste. Mercury abatement by substituting mercury-free laundering chemicals is also possible. Laundering chemicals can also be pretreated to remove mercury before use. Filtering caustic prior to use could possibly reduce mercury in the waste water by as much as 40%. (Snyder-FIRL)
W76-11602

YIELD AND HEAVY METAL CONTENT OF FOOD CROPS GROWN ON SOILS AMENDED WITH SEWAGE SLUDGE,
California Univ., Riverside.
F. T. Bingham, G. A. Mitchell, R. J. Mahler, and A. L. Page.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 30-6-1 - 30-6-4. 5 tab, 14 ref.

Descriptors: *Sewage sludge, *Heavy metals, *Plant growth, *Phytotoxicity, Crop production, Lettuce, Wheat, Cadmium, Zinc, Copper, Nickel, Soils.
Identifiers: *Land application.

Wheat and Romaine lettuce were grown in two different soils (calcareous and acidic) treated with a sewage sludge enriched with sulfates of cadmium, copper, nickel, or zinc to test the availability of sludge-borne heavy metals to plants. The zinc, copper, nickel, and cadmium concentrations in wheat grain grown in soil with metal additions ranging from 0-160 micrograms/gram of soil ranged from 73-185, 7.1-11, less than 1.0-119, and less than 0.1-87 micrograms/gram of wheat, respectively. The corresponding values for Romaine lettuce were: 82-1058, 6.2-8.2, 3.5-345, and 1.6-593 micrograms/gram of lettuce, respectively. Cadmium was the most toxic in terms of curtailing crop yields. The pH of the soil also affected the growth of crops and the availability of sludge-borne heavy metals to plant tissue. (See also W76-10637) (Kreager-FIRL)
W76-11610

ENVIRONMENTAL ASSESSMENT OF MARINE OUTFALLS,
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5E.
W76-11615

MANAGEMENT AND FINANCING ALTERNATIVES FOR WASTE DISPOSAL IN COASTAL AREAS,
North Carolina Univ. at Chapel Hill. Inst. of Government.
For primary bibliographic entry see Field 5E.
W76-11616

DEEP WELL DISPOSAL OF WASTEWATER,
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5E.
W76-11617

THE AVAILABILITY OF DESALTING FOR WATER SUPPLY FROM SALINE SOURCES,
Office of Water Research an Technology, Washington, D. C.
For primary bibliographic entry see Field 3A.
W76-11619

WASTEWATER REUSE IN COASTAL AREAS,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Sciences and Engineering.
F. E. McJunkin.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, Unversity of North Carolina, p 111-123. 2 tab, 7 ref.

Descriptors: *Waste water treatment, *Water supply, *Water demand, *Percolation, *Injection wells, *Water reuse, Water utilization, Coasts, Saline water intrusion, Septic tanks, Aquifers, Groundwater, Industrial water.

Prospects for waste water reuse in the southeastern coastal states are discussed. The potential for direct and indirect waste water reuse is especially high in areas where municipal water supply problems exist. Such areas include the southeastern coastal communities where water demand often exceeds conventional water supplies. Reuse for industrial supply appears to offer the greatest near-term potential for increasing available water resources. One type of reuse often practiced in coastal areas is the return of septic tank effluents or other waste waters to groundwater by percolation through the soil. This leads to the possibility of returning sewage plant effluent, via percolation or well injection, to groundwater aquifers where depletion or salt-water intrusion has occurred. The technology for meeting water standards required by the majority of industrial and agricultural uses is currently available for waste water treatment, and only economics seem to limit increased waste water reuse. Data on industrial users of reclaimed municipal waste water are tabulated along with the status of technology for removing common constituents in waste water. (See also W76-11224) (Kreager-FIRL)
W76-11620

MAN DISCOVERS THE COASTAL ENVIRONMENT: A FOOTPRINT IN THE SAND,
North Carolina State Univ. at Raleigh. University Studies.
J. C. Wallace.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, University of North Carolina, p 133-138.

Descriptors: *Coasts, *Planning, *Waste water treatment, *Legislation, Land use, Administration, Federal government, State governments, Federal Water Pollution Control Act.

Poor planning practices and their effects on the southeast coastal environment are reviewed along with some recent improvements in planning. Heavily populated coastal areas without waste water treatment systems as well as areas with overloaded waste treatment systems are cited as examples of inadequate planning. Recent developments in support of more effective planning include the Federal Coastal Zone Management Act, the Federal Water Pollution Control Act Amendments of 1972, and individual actions by states such as the North Carolina Coastal Area Management Act. Some form of federal land use planning is also anticipated in the near future. (See also W76-11224) (Kreager-FIRL)
W76-11621

FIRST THE WATER, THEN THE SEWER, THEN LAND USE PLANNING: COASTAL PLANNING IN RETROSPECT AND IN THE NOW,
North Carolina State Planning Div., Raleigh.
J. R. Hinkley.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, University of North Carolina, p 139-147.

Descriptors: *Planning, *Land use, *Coasts, *North Carolina, *Water supply, *Waste water treatment, Treatment facilities, Legislation, Industrial wastes, Domestic wastes.

Inadequacies in land use planning along the southeastern coastal area are discussed in relation to water supply and waste treatment problems. A review of residential and industrial strip development along the North Carolina coast reveals that water supply and waste water treatment facilities which were originally designed for limited services are now being overloaded by additional coastal-rural strip developments. Legislation passed by the state's general assembly to insure better land use planning in the future includes the Coastal Area Management Act and the State Land Policy Act. A Coastal Resources Commission and Coastal Resources Advisory Council have been activated to guide the formulation of land use plans in each of the state's 20 counties and their respective municipalities in the coastal area. (See also W76-11224) (Kreager-FIRL)
W76-11622

IMPACT OF WATER SUPPLY AND WASTEWATER ON THE COASTAL AND MARINE ENVIRONMENTS,
North Carolina State Univ., Raleigh. Sea Grant Program.
B. J. Copeland.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, University of North Carolina, p 178-187.

Descriptors: *Water supply, *Waste water treatment, *Atlantic coastal plain, *Groundwater availability, *Water reuse, Desalination, Septic tanks, Outlets, Oceans, Injection wells, Recycling, Solid wastes, Methane, Byproducts, Planning, Coasts.

Water supply and waste water treatment problems associated with southeastern coastal communities are reviewed along with the need for the development of comprehensive community planning. Potential environmental problems are discussed for the following water supply and waste water treatment alternatives: the pumping of fresh water from groundwater supplies, desalination, waste water reuse, the transport of water from other areas, the use of septic tanks, land disposal, deep-well injection, conventional waste water treatment, and the disposal of waste water via ocean outfalls. The recycling of waste water through the water supply system appears to be an optimal choice for solving water problems in the coastal zone. This process also appears capable of eliminating many waste disposal problems. Solids generated by recycling processes might conceivably be used for the generation of methane gas. (See also W76-11224) (Kreager-FIRL)
W76-11625

5E. Ultimate Disposal Of Wastes

HYDRAULIC COLLECTION AND DISPOSAL OF REFUSE,
Meta Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5D.
W76-11138

A FORCED AERATION SYSTEM FOR COMPOSTING WASTEWATER SLUDGE,
Agricultural Research Service, Beltsville, Md. Biological Waste Management; and Agricultural Research Service, Beltsville, Md. Soil Nitrogen Lab.
E. Epstein, G. B. Willson, W. D. Burge, D. C. Mullen, and N. K. Enkiri.
Journal Water Pollution Control Federation, Vol. 48, No. 4, p 688-694, April, 1976. 8 fig, 5 ref.

Descriptors: *Aeration, *Sludge treatment, *Odor, *Coliforms, *Salmoneall, *Waste water treatment, Microorganisms, Biological treatment, Temperature, Temperature control, Waste water treatment.
Identifiers: Forced aeration, Composting.

Studies investigating the use of forced aeration for composting raw waste water sludge without the release of odors are reported. Suction applied early during composting in a pile insulated with screened compost avoids the release of odorous gases to the atmosphere. Destruction of total coliforms, fecal coliforms, and salmonellae is much greater with the forced aeration method than it is with windrow composting. A survival of microorganisms in the lower corner of the pile is believed to be a result of a lack of insulation or compost depth and the resulting heat loss in this section. Most of the temperatures recorded are in the thermophilic range. Efforts are underway to achieve more uniform temperatures throughout the piles by modifying the suction system. (Kreager-FIRL)
W76-11200

LAND TREATMENT OF MUNICIPAL WASTEWATER,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 5D.
W76-11207

PROCEEDINGS OF THE SOUTHEASTERN CONFERENCE ON WATER SUPPLY AND WASTEWATER IN COASTAL AREAS,
North Carolina Water Resources Research Inst., Raleigh.
For primary bibliographic entry see Field 5D.
W76-11224

WATER SUPPLY AND WASTEWATER DISPOSAL - PLANNING AND PROBLEMS - IN COASTAL AREAS,
Oesen (Henry von) and Associates, Inc., Wilmington, N. C.
For primary bibliographic entry see Field 5D.
W76-11225

OCEAN OUTFALL DISPOSAL SYSTEMS,
Engineering-Science, Inc., Berkeley, Calif.
For primary bibliographic entry see Field 5D.
W76-11226

LAND DISPOSAL OF WASTEWATER,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
F. J. Humenik.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, University of North Carolina, p 48-59. 3 fig, 4 tab.

Descriptors: *Waste water disposal, *Irrigation, *Waste water treatment, *Aeration, *Ponds, Municipal wastes, Industrial wastes, Nitrogen, Heavy metals, Phosphorus, Solid wastes.
Identifiers: Hydraulic loading, Land disposal, Process load.

The use of land application for the disposal of municipal and industrial waste water is discussed. Terminal disposal via land irrigation is limited either by the hydraulic or process load. The higher the degree of pretreatment provided or the lower the concentration of nitrogen, the more hydraulic loading predominates as the controlling factor; whereas, hydraulic load becomes insignificant when dealing with waste water that has a high concentration of any constituent that affects the plant-soil receiver system. Aerated ponds can provide significant pretreatment at a very low cost. Up to 85% nitrogen removal in pond systems appears possible with minimum horsepower requirements for complete surface agitation. Pond systems are also effective for heavy metal removal if the organic waste input is high and the organic metal complex remains in the bottom sludge. It is not always best to treat waste water to as high a degree as possible before discharge to streams because land-based systems can provide a more economical alternative. The use of land application as a substitute for tertiary treatment of nitrogen, phosphorus, metals, and solids appears to be a much less expensive method of meeting current regulatory criteria in most areas. (See also W76-11224) (Kreager-FIRL)
W76-11227

SHALLOW SUBSURFACE DISPOSAL OF WASTEWATER,
North Carolina Dept. of Natural and Economic Resources. Div. of Environmental Management.
A. C. Turnage, Jr.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, University of North Carolina, p 60-67.

Descriptors: *Waste water disposal, *Coasts, *Soil disposal fields, *Septic tanks, *Waste water treatment, *Subsurface flow, Nitrification, Disposal, Treatment, Coliforms, Viruses, Design criteria, Regulation.

The use of shallow subsurface systems for the disposal of waste water in coastal areas is discussed. Septic tank-nitrification line systems appear to be suitable for low-density coastal areas where the proper soil structure exists and where adequate separation from surface waters and groundwaters can be maintained. Particular attention must be paid to the possible presence of a compacted muck or vegetative layer underlying sand fills because of the likelihood of an impervious interface, resulting in the horizontal movement of effluent. Indiscriminate and unwise development where septic tank systems are used poses a potentially serious danger of contaminating the adjacent waters with fecal coliform and viruses. The introduction of treated waste water to the soil subsurface is another method of shallow disposal in coastal areas, though this method is considered mainly as an interim solution to waste disposal, pending the development of regional sewage collection and treatment systems with ocean outfalls. Regulations and design criteria for shallow subsurface systems established by the North Carolina Environmental Management Commission are outlined. (See also W76-11224) (Kreager-FIRL)
W76-11228

SUMMARY: TECHNOLOGICAL ALTERNATIVES FOR WATER SUPPLY AND WASTEWATER DISPOSAL IN THE COASTAL AREA,
Clemson Univ. S. C. Dept. of Civil Engineering.
B. L. Edge.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, University of North Carolina, p 124-132.

Descriptors: *Waste water disposal, *Waste water treatment, *Coasts, *Oceans, Recycling, Septic tanks, Injection wells, Aquifers, Ecosystems, Chemical reactions, Water pollution effects, Technology.

Technological alternatives for waste water disposal in coastal areas are reviewed. Recycling appears to be attractive for the disposal of most wastes in coastal areas, though ocean disposal techniques that cause minimal damage to the ecosystem may be necessary for some types of wastes. Evidence indicating that life in the oceans has diminished by as much as 50% in the last 20 years, however, argues against the indiscriminate use of ocean outfalls. Subsurface waste disposal using septic tanks is considered generally unfeasible for coastal areas, particularly high-priced ocean front areas. Deep well disposal is another alternative for waste disposal in coastal areas; however, more information is required to assess the effect of high pressures and long residence times on the possible production of hazardous compounds from wastes injected into deep wells. The possible emergence of aquifers into the ocean must also be considered in terms of disrupting the ecosystem. (See also W76-11224) (Kreager-FIRL)
W76-11230

LAND APPLICATION OF WASTEWATER.
Environmental Protection Agency, Philadelphia, Pa. Region III.
For primary bibliographic entry see Field 5D.
W76-11231

LAND APPLICATION RESEARCH AT ROBERT S. KERR ENVIRONMENTAL RESEARCH LABORATORY,
Robert S. Kerr Environmental Research Laboratory. Ada, Okla.
For primary bibliographic entry see Field 5D.
W76-11232

LAND APPLICATION PRACTICES AND DESIGN CRITERIA,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 5D.
W76-11233

EXPERIENCES AT PENN STATE WITH LAND APPLICATION,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 5D.
W76-11234

OVERLAND FLOW TREATMENT OF WASTEWATER - A FEASIBLE APPROACH,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
For primary bibliographic entry see Field 5D.
W76-11235

INFILTRATION-PERCOLATION SYSTEMS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5D.
W76-11236

LAND APPLICATION OF TREATED SEWAGE IN THE MOUNTAIN STATE,
Campaign Clean Water, Charleston, W.Va.
For primary bibliographic entry see Field 5D.
W76-11237

THE TREATMENT OF WATER PURIFICATION PLANT WASTES,
Gore and Storrie Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 5F.
W76-11256

SYMBIOSIS MAKES COMPLETE WATER REUSE PRACTICAL,
For primary bibliographic entry see Field 5D.
W76-11258

WASTEWATER RECYCLE - THE PROPER APPROACH TO EVALUATION OF DISPOSAL VERSUS REUSE,
Ecodyne Corp., Union, N. J. Industrial Waste Treatment Div.
For primary bibliographic entry see Field 5D.
W76-11263

HOW TO DISPOSE OF TOXIC SUBSTANCES AND INDUSTRIAL WASTES,
Noyes Data Corporation, Park Ridge, N.J.
P. W. Powers.
Noyes Data Corporation, Park Ridge, New Jersey and London, England, Environmental Technology Handbook No. 4, 1976, 497 p.

Descriptors: *Industrial wastes, *Waste disposal, *Toxicity, *Reviews, Wastes, Water pollution sources, Chemical wastes, Radioactive waste disposal, Explosives, Pulp and paper industry, Wood wastes, Landfills, Oceans, Deep wells, Incineration, Biological treatment, Chemical degradation, Ultimate disposal, Sulfite liquors, Organizations, Pulp wastes, Bibliographies, Publications, Patents.
Identifiers: Flammable wastes, Printing industry, Black liquors.

This review of pertinent government reports, journal articles, U.S. patents, and other literature sources deals in detail with the ultimate disposal of toxic chemical, biological, radioactive, flammable, and explosive wastes from various industrial and other sources (including the graphic arts, wood, and pulp and paper industries). The topics are organized according to both origin (nature) of materials and method of disposal (land burial, landfill, ocean discharge, deep wells, incineration, biological and chemical degradation, and pretreatments for ultimate disposal). Among paper-industry wastes discussed are black liquors, spent

sulfite liquors, and pulping process vapors. A list of private waste-handling contractors and service organizations in the U.S.A. is appended. (Brown-IPC)
W76-11368

LAND TREATMENT AND DISPOSAL OF MUNICIPAL AND INDUSTRIAL WASTEWATER,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 5D.
W76-11370

AN EXPERIMENTAL HIGH-ASH PAPER MILL SLUDGE LANDFILL,
Michigan State Univ., East Lansing.
O. B. Andersland.
In: TAPPI Environmental Conference, Atlanta, Georgia, April 26-28, 1976, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 171-186. 17 fig, 15 ref.

Descriptors: *Sludge disposal, *Landfills, *Pulp wastes, Ultimate disposal, Wastes, Industrial wastes, Water pollution sources, Solid wastes, Sludge, Organic wastes, Consolidation, Soil mechanics, Soil stabilization, Waste disposal, Land forming, Shear strength, Settlement(Structural), Tile drains, Subsurface drains, Leachate, Groundwater, Mechanical engineering.

An experimental landfill for paper mill sludge rich in ash (mineral elements) was constructed and monitored to obtain engineering data essential for development of guidelines and recommendations for the design and operation of future landfills for solid paper mill wastes. Construction of the landfill is described, and physical properties of the sludge are summarized. Consolidation and settlement during the first year and movements within an excavated slope during the second year were closely monitored. The field behavior of the sludge during consolidation and after slope excavation was analyzed, using theories from geotechnical engineering. The primary compression of the sludge was very rapid, suggesting that preloading can be an effective way for stabilization and minimizing long-term settlements. Low sludge unit weight plus high stability of the consolidated sludge makes it suitable as a light weight fill material for embankments. The high shear strength of the consolidated sludge suggests that the landfill could be contoured to provide recreational areas, etc. Proper placement of sand or gravel blankets and/or tile drains will shorten the drainage time within the sludge, thereby reducing the time needed for primary consolidation. The drains could also be utilized to collect the leachate for subsequent treatment, to protect groundwater, etc. (Sykes-IPC)
W76-11379

UNOX SECONDARY SLUDGE DEWATERING STUDIES AT LONGVIEW FIBRE COMPANY,
Longview Fibre Co., Wash.
For primary bibliographic entry see Field 5D.
W76-11381

USING PAPER MILL SLUDGE AS CONCRETE ADMIXTURE,
Michigan Technological Univ. Houghton.
B. D. Alkire, and S. M. Newton.
Environmental Engineering Division, Proceedings of the American Society of Civil Engineers, Vol. 101, p 469-473, 1975. 2 fig, 6 ref, 1 tab.

Descriptors: *Sludge, *Pulp wastes, *Concrete additives, Wastes, Industrial wastes, Water pollution sources, Pulp and paper industry, Sludge disposal, Water pollution control, Compressive strength, Concretes, Portland cements, Michigan, Ultimate disposal, Waste disposal, Recycling.
Identifiers: Groundwood mills, Kraft mills.

As an initial investigation into the effect of a pulp and paper mill sludge on the compressive strength of concrete, a series of tests were conducted on concrete mortar cubes prepared with four different amounts of sludge, three water/cement ratios and ffour curing times. The sludge used as the additive was obtained from an integrated groundwood/kraft pulp and paper mill in Upper Michigan. The sludge was dried and ground until it passed a No. 100 standard sieve. The addition of 0.5% dried paper mill sludge to portland cement did not reduce the compressive strength of the concrete, but additions of 1 and 1.5% reduced the strength up to 20%. (Buchanan-IPC)
W76-11399

FLOCCULATION PROCESS,
Mobil Oil Corp., New York. (Assignee).
For primary bibliographic entry see Field 5D.
W76-11451

APPARATUS FOR DISPOSING OF ORGANIC WASTE MATERIALS,
L. E. Streebin, and N. A. Nassef.
U.S. Patent No. 3,956,126, 6 p, 4 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 946, No 2, p 731, May 11, 1976.

Descriptors: *Patents, *Domestic wastes, *Industrial wastes, *Organic wastes, *Water pollution sources, *Waste disposal, Evaporation, Heat exchangers, Incineration, Condensation, Water reuse, Equipment.
Identifiers: Combustion, Internal combustion engine.

The invention provides an apparatus or system for efficiently disposing of organic waste materials, including sewage and garbage. The waste material is directed to an evaporator where the liquid content of the waste material is evaporated by the use of a suitable heat exchange medium. The heat exchange medium is heated by exhaust gases from an internal combustion engine, and also by the heat of combustion developed by burning in the hot exhaust gases from the engine, substantially all of the solid residue remaining in the evaporator after the water has been removed. The liquid from the evaporator is recondensed and can be recycled for re-utilization or can be discharged if desired. The products of combustion constitute a small amount of ash and carbon dioxide and can be discharged to the atmosphere from the exhaust pipe of the engine. (Sinha-OEIS)
W76-11455

MODELING THE FATES OF METALS IN OCEAN-DISCHARGED WASTEWATERS,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5B.
W76-11464

ENVIRONMENTAL PROTECTION AGENCY'S ROLE, INTERESTS, AND RESPONSIBILITIES WITH RESPECT TO THE OUTER CONTINENTAL SHELF DEVELOPMENT,
Environmental Protection Agency, Johns Island, S. C. Office of Research and Development.
For primary bibliographic entry see Field 6G.
W76-11479

STUDIES ON THE IMPROVEMENT EFFECT OF WASTE LIQUOR FROM PULP MILLS FOR THE SOILS: I. THE VEGETATION EXPERIMENTS WITH SOYBEANS AND CORN, (IN JAPANESE),
Shimane Univ., Matsue (Japan). Faculty of Agriculture.
N. Koshiba.
Bull Fac Agric Shimane Univ. 7, p 135-139, 1973.

Descriptors: *Soybeans, *Corn(Field), Vegetation, Pulp wastes, Soils, Waste disposal, *Application rates, Water reuse.
Identifiers: *Waste liquor.

Best results were obtained when waste liquor was applied to the soil 1-2 wk before seeding; a later application delayed germination. The waste liquor was especially effective for volcanic soil and loam soil. The waste liquor has the same or better soil-improving effect than compost. The optimum application rate was about 500 kg/10 acres.--Copyright 1975, Biological Abstracts, Inc.
W76-11563

YIELD AND HEAVY METAL CONTENT OF FOOD CROPS GROWN ON SOILS AMENDED WITH SEWAGE SLUDGE,
California Univ., Riverside.
For primary bibliographic entry see Field 5D.
W76-11610

ENVIRONMENTAL ASSESSMENT OF MARINE OUTFALLS,
Environmental Protection Agency, Atlanta, Ga. Region IV.
D. R. Hopkins.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, University of North Carolina, p 27-34.

Descriptors: *Waste water disposal, *Outlets, *Permits, *Legislation, *Oceans, *Coasts, *Florida, Atlantic coastal plain, Effluents, Waste water treatment, Legal aspects, Evaluation.
Identifiers: Federal Water Pollution Control Act Amendments.

Federal criteria for the issuance of ocean disposal permits for waste outfalls are reviewed along with Environmental Protection Agency studies of the potential impact of ocean outfalls in southeast Florida. The Federal Water Pollution Control Act Amendments of 1972 establish criteria for the issuance of permits for ocean discharges based on the following considerations: the environmental effects of the proposed waste disposal operation, the need for ocean disposal, alternatives to ocean disposal, and the effect of the proposed action on aesthetic, recreational, economic, and other values associated with the ocean. The criteria deal with the evaluation of individual permit applications on a case-by-case basis from information supplied by the applicant concerning the characteristics of the waste and the effect of the waste water on the receiving environment. An Environmental Protection Agency study of alternative waste water disposal methods in southeast Florida concludes that disposal of secondary treated waste water to the ocean via outfalls is a viable method of disposal for the area. (See also W76-11224) (Kreager-FIRL)
W76-11615

MANAGEMENT AND FINANCING ALTERNATIVES FOR WASTE DISPOSAL IN COASTAL AREAS,
North Carolina Univ. at Chapel Hill. Inst. of Government.
W. J. Wicker.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, University of North Carolina, p 35-47. 9 ref.

Descriptors: *Coasts, *Waste water disposal, *Financing, *Management, Waste disposal, State jurisdiction, State governments, Local governments, Effluents.

Alternatives for the management and financing of waste disposal in coastal areas are discussed. The traditional approach to the financing and manage-

ment of coastal area waste disposal which involves the acceptance of local responsibility by cities and towns appears unlikely to meet present and future needs in many cases, and joint action by county and local governments appears to be needed along with direct state participation in some cases. One mixed possibility involves state financing and local management, with the state prescribing the standards for the entire management structure of the waste disposal operations. Another possibility involves the establishment of separate boards which represent local and state agencies and operate under general state supervision. (See also W76-11224) (Kreager-FIRL)
W76-11616

DEEP WELL DISPOSAL OF WASTEWATER,
Environmental Protection Agency, Atlanta, Ga. Region IV.
J. W. Crooks, and C. W. Sever.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, University of North Carolina, p 68-74. 3 ref.

Descriptors: *Waste water disposal, *Coasts, *Water reuse, *Deep wells, *Injection wells, *Aquifers, Water distribution(Applied), Water management(Applied), Water conservation, Viruses, Bacteria, Waste water treatment, Legislation, Regulation.
Identifiers: Safe Drinking Water Act.

The use of deep-well injection for the disposal of waste water and the preservation of usable groundwater supplies is discussed. The use of deep injection wells for the storage of treated waste water in salt water aquifers can in some cases provide a twofold benefit: potentially harmful viruses and bacteria that might survive secondary treatment are removed from man's environment; and the injected fresh waste water displaces a poorer quality (salty) groundwater, thus creating a new reserve of usable water in underground storage. Along many coastal areas in particular, the heavy withdrawal of potable groundwater from fresh-water aquifers is causing salt water encroachment inland into the aquifer system; and, in such cases, treated waste water may be injected into the aquifer system to create a hydraulic barrier and hold back the encroaching salt water. Regulations of the Safe Drinking Water Act which deal with the protection of groundwater from the injection of wastes into the ground are reviewed along with Environmental Protection Agency policies on water reuse. (See also W76-11224) (Kreager-FIRL)
W76-11617

ECONOMIC IMPLICATIONS OF COASTAL WASTE DISPOSAL ALTERNATIVES,
Georgia Univ., Athens. Inst. of Natural Resources.
R. M. North.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, 1975, Wilmington, North Carolina, University of North Carolina, p 148-159. 2 tab, 3 ref.

Descriptors: *Waste water treatment, *Coasts, *Economics, *Economic efficiency, *Cost analysis, Cost allocation, Estuaries, Dissolved oxygen, Oxygenation, Treatment facilities, Administration, Water quality control.

The economics of alternative waste water disposal systems for coastal areas are evaluated. Economic alternatives are assessed in terms of the degree of water quality desired, the type of institutional arrangements required, and the method of paying for a given water quality level. Estimated costs of alternative waste treatment systems for the Delaware and Potomac Estuaries are calculated and reveal that in each case simple instream reoxygenation can be used to achieve a given level of dissolved oxygen at a cost substantially less than that required for uniform conventional waste water treatment. Failure to implement least cost solutions to waste problems appears to often result from a lack of institutional flexibility and a misallocation of resources. (See also W76-11224) (Kreager-FIRL)
W76-11623

5F. Water Treatment and Quality Alteration

DEBATE GROWS OVER WATER PURIFICATION METHODS.
Chemical and Engineering News, Vol. 54, No. 26, p 34, 39, June 21, 1976.

Descriptors: *Waste water treatment, *Treatment facilities, *Water purification, *Disinfection, Viruses, Coliforms, Chlorination, Water quality standards, Ozone.

Criteria for achieving disinfection of water and waste water were discussed at a forum sponsored by the International Ozone Institute. Waste water disinfection has been defined as the reduction of virus and fecal coliform bacteria concentrations to acceptable levels. In the United States, chlorination of waste water is the predominant treatment method, and laws require chlorine residuals in treated waters. An amendment, proposed in August 1975, would delete coliform bacteria limitations and instead require EPA to determine disinfection according to water quality standards. An important chlorine alternative is ozonation. Possibilities for converting chlorination treatment facilities are discussed. In the United States, an ozone treatment project has been operating since 1971 at Blue Plains, near Washington, D.C. Estes Park, Colorado and Cleveland, Ohio, have also adopted ozonation. (Kramer-FIRL)
W76-11205

BIN ACTIVATORS RELIABLY FEED LIME AND DIATOMACEOUS EARTH IN WATER TREATMENT FACILITY.
Pollution Engineering, Vol. 8, No. 6, p 14, 18, June, 1976. 1 fig.

Descriptors: *Treatment facilities, *Water treatment, *Lime, *Diatomaceous earth, *Automation, Sludge disposal, Sludge, Mechanical equipment.
Identifiers: *Bin activators.

An automated system to feed diatomaceous earth and pebble lime assures that a filter washwater and alum sludge disposal facility installed by Passaic Valley Water Commission (PVWC) at their Little Falls Water Treatment Plant in Totowa, New Jersey, will operate successfully. The new plant eliminates the discharge of 20 tons of sludge a day into the Passaic River and enables PVWC to meet the 1985 Federal zero discharge requirements. The new facility, which utilizes sludge presses, requires uninterrupted flow of diatomaceous earth and lime to the dewatering system from storage bins. Approximately 6500 and 1100 lb of pebble lime and diatomaceous earth, respectively, are fed to the system daily. To eliminate possible flow problems, four Vibra Screw Bin Activators were installed on the storage bins. Lime is discharged to slakers, at the rate of 1000 lb/hr, through 8-in. diameter discharge outlets on three of the activators. The other Bin Activator discharges 400 cu ft/hr of diatomaceous earth to a heavy duty feeder. The Bin Activator is vibrated and replaces a static bin bottom, removing the compaction area where flow problems originate. The feeder is a rugged volumetric screw feeder whose trough and feed screw vibrate. Vibration of the trough maintains uniform density and insures complete filling and emptying of each of the screw's flights. Feeder output is determined by screw speed and is controllable to better than 1% accuracy. (Snyder-FIRL)
W76-11208

PROCEEDINGS OF THE ANNUAL CONFERENCE, ONTARIO SECTION, AMERICAN WATER WORKS ASSOCIATION; POLLUTION CONTROL ASSOCIATION OF ONTARIO; AND ONTARIO MUNICIPAL WATER ASSOCIATION.
Held April 20-23, 1974, at Toronto, Ontario, Canada. Published in Ottawa, 1976, 429 p.

Descriptors: *Water treatment, *Water purification, *Canada, *Water supply, *Disinfection, *Potable water, Chlorination, Water works, Treatment facilities, Monitoring, Waste water treatment, Water pollution control, Pollution abatement, Waste disposal.

Papers selected from this Conference include: Disinfection, Dechlorination and Toxicity to Fish, by James A. Servizi and Dennis W. Martens; Viral Contamination of the Water Environment, An Underestimated Problem, by Dr. M. S. Mahdy; Commuter-Aided Planning of a Regional Disposal System for Municipal Sludge, by F. J. Allan, P. L. Silveston, W. C. Keay and E. R. Simonen; Urban Drainage: Problems and Possibilities, by Don. H. Waller: Environmental Assessment - A Planning Tool, by Mel Plewes; The Great Lakes Agreement - A Mid-Term Perspective, by Raymond M. Robinson; Contemporary Chlorine Disinfection Practices in Ontario, by Charles J. H. Kretch; Automated Fluoridation Using a Selective Ion Electrode, by Wayne Manley; Pre-Treatment of Water Supplies Utilizing Ferric Chloride, by John A. Carnduff; A New Concept in Small Water Systems, by George Aldworth; Maintenance Management of Waterworks Systems, by James L. Smith; Construction Safety in Waterworks, by Charles E. McKnight; Safety in Water and Wastewater Plants, by Ray Norton; Metropolitan Toronto's Approach to Preventive Maintenance for Treatment Plants, by Earl Baldock; Operator Training and Certification in Canada, by Alex Redekopp; Training and Certification: Ontario Ministry of Environment, by Robert R. Doddridge; Northern Environmental Engineering - A Canadian Challenge, by R. N. Dawson and J. W. Slupsky; and Treatment of Water Purification Plant Wastes, by R. A. G. Simmons and A. J. Bowers. (See also W76-11250 thru W76-11256)
W76-11249

CONTEMPORARY CHLORINE DISINFECTION PRACTICES IN ONTARIO,
Knox Martin Kretch Ltd., Bramalea (Ontario).
C. J. H. Kretch.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 179-198. 2 fig, 6 ref.

Descriptors: *Disinfection, *Potable water, *Chlorination, *Water purification, Water treatment, Treatment facilities, Groundwater, Surface waters, Water supply.
Identifiers: Free residual chlorination, *Dechlorination, Ammoniation, Chloramination.

Methods for the disinfection of potable water supply sources obtained from both surface and subsurface supplies are discussed, with particular emphasis on chlorine disinfection practices in Ontario, Canada. The following disinfection practices are reviewed: plain chlorination, free residual chlorination, free residual chlorination followed by dechlorination, and chloramination. In general, only plain chlorination is employed for disinfection of potable water supplies throughout Ontario, although Toronto is using free residual chlorination followed by dechlorination at its older plants and free residual chlorination and dechlorination followed by ammoniation at recently constructed facilities. Recently, a trend has been initiated for the adoption of compulsory free residual chlorination at all installations throughout Ontario. (See also W76-11249) (Kreager-FIRL)
W76-11250

AUTOMATED FLUORIDATION USING A SELECTIVE ION ELECTRODE,
Peterborough Utilities Commission, Peterborough, Ontario, Canada, Filtration Plant.
W. Manley.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 200-209, 2 fig, 5 ref.

Descriptors: *Fluoridation, *Potable water, *Analytical techniques, *Monitoring, *Fluorides, *Electrodes, Automatic control, Equipment, Automation, Water treatment, Pumps, Treatment facilities, Pollutant identification.
Identifiers: *Selective ion electrodes.

The use of selective ion electrode systems for monitoring fluoride ion concentrations and controlling the fluoride residual in drinking water supplies is discussed. Unlike colorimetric methods of fluoride measurement, very few physical or chemical interferences occur with the fluoride selective ion electrode. There is no need to dechlorinate or remove the turbidity or color from the sample being measured, and no time-consuming distillation is required. Hydroxide interference can be eliminated by the use of total ionic strength buffers which also provide a high ionic strength background, thereby swamping out variations in sample ionic strength. A continuous analysis and control system for maintaining the proper fluoride residual is outlined. The system utilizes a selective ion electrode in combination with a duplex pump whose stroke length varies in accordance with signals received from the analyzer so that the desired fluoride residual is maintained. (See also W76-11249) (Kreager-FIRL)
W76-11251

PRE-TREATMENT OF WATER SUPPLIES UTILIZING FERRIC CHLORIDE,
Westerly Filtration Plant, Toronto (Ontario). Quality Control Office.
J. A. Carnduff.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 211-227. 9 tab, 7 ref.

Descriptors: *Coagulation, *Water purification, *Iron compounds, *On-site investigations, Feasibility studies, Chemical reactions, *Water treatment, Performance, Evaluation, Costs, Economics, *Pre-treatment(Water).
Identifiers: Ferric chloride, Alum, Aluminum sulfate, Coagulants.

Laboratory, pilot plant, and field tests were conducted to determine the feasibility of using ferric chloride as a substitute coagulant for alum during water treatment operations. The chemical reactions of coagulation in which iron salts react with water to form floc are similar to those of aluminum sulfate, with the main reaction in both instances being between the metal salt and the natural alkalinity in the water to produce complex hydrous oxide compounds. Pilot plant studies established that ferric chloride can be applied in dosages up to 10 ppm in high rate filters operating at rates up to 4 grams/min/sq ft. Tests at a water treatment plant using 1 ppm of ferric chloride showed satisfactory results; increasing the dosage up to 6 ppm only decreased the filter run length while maintaining the same quality of filtered water. The iron in the filtrate was usually less than 0.015 ppm, with only one run exceeding 0.050 ppm. The dosage of ferric chloride required to produce results comparable to those obtained with alum was generally half that for alum addition. A comparison of the costs of ferric chloride versus alum reveals that significant savings can be realized by using ferric chloride as a substitute coagulant. (See also W76-11249) (Kreager-FIRL)
W76-11252

A NEW CONCEPT IN SMALL WATER SYSTEMS,
MacLaren (James F.) Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 5D.
W76-11253

MAINTENANCE MANAGEMENT OF WATERWORKS SYSTEM,
Thorne Riddell Associates Ltd., Toronto (Ontario).
J. L. Smith.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 249-253. 1 fig.

Descriptors: *Water treatment, *Water works, *Maintenance, *Planning, *Budgeting, *Management, *Treatment facilities, Repairing, Maintenance costs, Equipment, Costs.

A system of maintenance management for water works is outlined. The system is designed so that a budget developed will be based not solely on historical data but also on the requirements and capabilities as provided by the level of service and productivity. Basic information required before a work plan and budget can be achieved includes: an inventory of the facilities to be maintained, desired performance standards, the required level of service, and reporting procedures for establishing productivity standards. Financial data can then be added to the above information to develop unit costs (for example, cost per mile of pipe repaired). Benefits gained by establishing a maintenance management program for water works include: the provision of a standard level of service to all people being served by the system, the establishment of an annual work schedule to take into account predicted peaks and lows in work load, and the avoidance of duplication by planning and allocating work in advance. (See also W76-11249) (Kreager-FIRL)
W76-11254

METROPOLITAN TORONTO'S APPROACH TO PREVENTATIVE MAINTENANCE FOR TREATMENT PLANTS,
Metropolitan Toronto Dept. of Works, (Ontario). Water and Pollution Control Directorate.
E. H. Baldock.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 332-346. 8 fig, 1 tab.

Descriptors: *Maintenance, *Treatment facilities, *Water treatment, *Computer programs, Equipment, Repairing, Instrumentation, Canada, Costs.
Identifiers: Inventories, Toronto.

A pilot-scale, computerized equipment maintenance and inventory system being used at water treatment plants in metropolitan Toronto is described. Each piece of equipment being maintained is numbered so that data on its condition can be stored in a computer. The data stored include a cost inventory of all units, a preventative maintenance schedule of all components of the equipment, and a history of the maintenance work which includes the man hours of work performed. The maintenance cycle is a function of the operating hours of each piece of equipment, and this information is fed into the computer on a regular basis. The computer prints out on a weekly basis a list of components to be serviced that week. Upon completion of the task, the workman then records the updated condition of the repaired equipment. Formats used for recording the above data are illustrated. (See also W76-11249) (Kreager-FIRL)
W76-11255

THE TREATMENT OF WATER PURIFICATION PLANT WASTES,
Gore and Storrie Ltd., Toronto (Ontario).
R. A. G. Simmons, and A. J. Bowers.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 404-429, 6 fig, 1 tab, 5 ref.

Descriptors: *Water purification, *Waste treatment, *Waste disposal, *Cost analysis, *Land use, Landfills, Sewerage, Filtration, Freezing, Lagoons, Drying, Byproducts, Recycling, Centrifugation.
Identifiers: Water treatment wastes.

Various methods for the treatment and disposal of water purification plant wastes are reviewed. Topics covered include: waste reduction by reducing water usage or implementing process changes; waste collection and centralization; and treatment and disposal options such as barging to sea, lagooning, sand bed drying, discharge to sanitary sewers, freezing, vacuum filtration, centrifuging, filter pressing, and coagulant recovery. Pressure filtration, lagooning, and disposal to sewerage systems are cited as the most probable solutions to waste problems resulting from water purification activities. Alternative final disposal sites are also discussed and include: sanitary landfill sites, specially selected non-agricultural sites, and agricultural land. A cost analysis of alternative waste treatment and disposal processes is presented. (See also W76-11249) (Kreager-FIRL)
W76-11256

AUTOMATED POND WATER TREATMENT UNIT,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
C. E. Rice, J. E. Garton, and L. Jarrell.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 570, $3.50 in paper copy, $3.00 in microfiche. Completion Report, (1976). 16 p, 7 fig, 1 tab, 1 ref. OWRR-A-060-OKLA(1).

Descriptors: *Water treatment, Ponds, *Filters, *Pumps, Storage tanks, Waste water treatment, *Pumping, Chlorine.
Identifiers: Rural water supply, Upflow filters, *Sand filters, Backflushing, Alum.

An automated pond water treatment unit was designed, constructed and evaluated. It was designed as an exterior unit to be located in the vicinity of a pond or lake. The unit was self-contained and furnished filtered and chlorinated water under pressure. The unit consisted of a pond water pump, chlorine and alum solution containers with metering pumps, a sand filter, a time clock and solenoid for backflushing, storage for treated water and a water pressure pump and storage tank. The sand filter was an upflow type which permitted the floc to settle out and be removed by backflushing. The pond water pump had a capacity of nine gallons per minute (34 liters per minute) and the pressure pump a capacity of about eight gallons per minute (30 liters per minute). The unit was located at Hams' Lake, a flood detention reservoir that usually had fairly clear water. Tests with the units showed that it was not filtering the water properly so modifications were made. Also, the solenoid value restricted the backflush flow too much so it was removed and a gate valve installed for manual operation. Additional tests suggested other minor changes. After these modifications and changes, the unit produced a good quality water.
W76-11340

HYPOLIMNION OXYGENATION,
Union Carbide Corp., New York. (Assignee).
For primary bibliographic entry see Field 5G.
W76-11454

UNDERDRAIN FOR WATER FILTRATION SYSTEM,
Hi-Ran Ltd., Charlotte, N. C. (Assignee).
J. R. Sturgill.
U. S. Patent No. 3,956,134, 9 p, 15 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 946, No 2, p 733-734, May 11, 1976.

Descriptors: *Patents, *Water treatment, *Waste water treatment, *Water purification, *Water quality, Filtration, Filters, Equipment, Nozzles, Drains.
Identifiers: Filtration systems, Filter media, Backwashing.

Water-filtration systems of the gravity type are employed for filtering high volumetric flow rates of liquids in municipal and industrial water treatment and waste treatment plants. The filtration system comprises one or more filters, each employing a bed of finely-divided granular filter media for filtering a liquid as it seeps downward through the filter bed. After a number of hours of filtration, it becomes necessary to wash the bed of filter media in order to remove the material trapped. Washing is accomplished by pumping water under pressure through the conduit in reverse direction into the system of fluid passageways in the underdrain system, and then upward through the perforations in the underdrain and into the overlying bed of filter media. The backwashing operation must be performed carefully to avoid disturbing or damaging the bed by opening channels or 'blow holes'. The object of this invention is to overcome the problem of forming blow holes during backwashing and to improve the distribution of wash water to insure effectively washing all areas for shorter periods of time. Each underdrain unit is provided with nozzles in the upper wall. The cooperating nozzles in each group are so oriented so as to direct streams of wash water into impingement with each other outside the filter underdrain unit to disperse the streams of wash water and reduce its velocity. (Sinha - OEIS)
W76-11458

HYGENIC EVALUATION OF IONIC COMPOSITION OF AN IMITATION OF DESALINATED SEA WATER, (IN RUSSIAN)
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
For primary bibliographic entry see Field 5C.
W76-11529

REMOVAL OF HYDROGEN SULFIDE FROM DRINKING AND INDUSTRIAL WATER, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Moscow (USSR).
G. Y. Ass, O. S. Bakharevskaya, V. A. Klyachko, M. F. Lazareva, and O. L. Leventon.
Gig Sanit. 38(8), p 87-88, 1973.

Descriptors: Hydrogen sulfide, Potable water, Industrial water, Oxidation, Bacteria, Water treatment, Waste water treatment, Artesian wells.
Identifiers: *Thiobacillus-Thioparus.

An experimental device is described for removing H2S from water which consisted of a 350-l vessel with a diameter of 0.67 m and height of 1 m which was filled with a 0.5-m-high layer of rubble. The water from an artesian well passed through a water-jet pump for enrichment with atmospheric 02 and was delivered to the rubble through a 12-mm-diameter perforated pipe with four 3-mm-diameter holes spaced 16.5 mm apart which was laid on the bottom of the vessel. Between 90 and 95% of the H2S was removed from the water during the 30-60 min stay of the water in the device with an air delivery rate of 3-5 m3/m3 of water. The presence of a large number of Thiobacillus thioparus in the biofilm of the device indicated that oxidation of H2S occurred biologically.--Copyright 1975, Biological Abstracts, Inc.
W76-11541

STUDY OF THE EFFECT OF WATER DESALINATED BY ELECTRODIALYSIS ON SOME BIOLOGICAL OBJECTS, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Selskoi Gigieny, Saratov (Gigieny).
For primary bibliographic entry see Field 5D.
W76-11548

CERTAIN ASPECTS OF THE PROCESS OF ENTEROVIRUS INACTIVATION WITH CHLORINE, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR)
E. L. Lovtsevich.
Gig Sanit 38(10), p 11-15, 1973.

Descriptors: *Chlorine, *Chlorination, *Viruses, Enteric bacteria, Water treatment, Water pollution.
Identifiers: *Enterovirus, *Poliovirus.

An experimental study of poliovirus inactivation during water chlorination showed that C1-inactivated virus could not be reactivated. The amount of residual C1-present in water of water pipe did not inactivate virus introduced into water as a result of secondary contamination. The process of virus inactivation with C1- did not depend exponentially on the time of C1-action. The part of the virus population (0.5-1%) that was more resistant to C1-, was not genetically different from the main part of the virus population; it did not consist of biologically active RNA and probably was formed by aggregations of virus particles.--Copyright Biological Abstracts, Inc. 1976.
W76-11568

REVIEW OF STANDARDS AND OTHER INFORMATION ON THERMOPLASTIC PIPING IN RESIDENTIAL PLUMBING,
National Bureau of Standards. Washington, D. C.
For primary bibliographic entry see Field 8G.
W76-11603

GROUNDWATER SUPPLIES OF THE COASTAL REGION,
H. E. LeGrand.
In: Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas, April 2-4, Wilmington, North Carolina, University of North Carolina, p87-101. 3 fig,16 ref.

Descriptors: *Water supply, *Groundwater resources, *Saline water intrusion, *Aquifers, *Coasts, Water pollution effects, Water mangement(Applied), Wells, Septic tanks.

Problems associated with the quality and availability of groundwater supplies along the east coast are reviewed. Groundwater suitable for domestic water supplies occurs at shallow depths throughout the coastal region, though pollution from septic tanks and other sources of manmade pollution is becoming a serious problem in developed areas. The tertiary limestone aquifer along the east coast is one of the most productive aquifers in the world; however, concentrated pumping in certain areas is causing salt water encroachment of this artesian source. Salt-water encroachment in artesian sand aquifers is not yet a serious problem, but excessive concentrated withdrawal of groundwater from these sources may lead to serious salt water problem in the future. A groundwater management policy involving the salvaging of water dicharged naturally into the sea and estuaries, the selective dispersion of centers of well water withdrawal, and the careful management of waste disposal practices is recommended. (See also W76-11224) (Kreager-FIRL)
W76-11618

5G. Water Quality Control

MUNICIPAL WASTES AS A FERTILIZER SOURCE,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W76-11117

BELGIUM (LEGISLATION ON UNDERGROUND WATERS).
Food and Agriculture Organization of the United Nations, Rome (Italy).
For primary bibliographic entry see Field 6E.
W76-11120

ENGLAND AND WALES, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United Nations, Rome (Italy).
For primary bibliographic entry see Field 6E.
W76-11121

FRANCE, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United States, Rome (Italy).
For primary bibliographic entry see Field 6E.
W76-11122

ISRAEL, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United Nations, Rome (Italy).
For primary bibliographic entry see Field 6E.
W76-11123

ITALY, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United Nations, Rome (Italy).
For primary bibliographic entry see Field 6E.
W76-11124

SPAIN, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United Nations, Rome (Italy).
For primary bibliographic entry see Field 6E.
W76-11125

TURKEY, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United States, Rome (Italy).
For primary bibliographic entry see Field 6E.
W76-11126

MARGINAL POLLUTION ANALYSIS FOR LONG RAGE FORECASTS,
Cornell Univ., Ithaca, N. Y. Center for Urban Development Research.
W. Isard, F. J. Cesario, and T. A. Reiner.
Regional Science Dissertation and Monograph Series No. 4, Center for Urban Development Research, Cornell University, Ithaca, New York, June 1975. 529 p, 31 fig, 133 tab, 113 ref, 14 appen.

Descriptors: *Methodology, *Forecasting, Effects, *Water pollution, *Air pollution, *Solid wastes, Industrial wastes, Domestic wastes, Transportation, Economics, Human population, Regional analysis, New York, Mathematical models, Systems analysis.
Identifiers: *Urban regions.

A practical method for forecasting the implications of growth for marginal (additional) pollution--air, water and solid waste--has been developed

with reference to various kinds of urban regions. The analysis framework explicitly recognizes the interrelated nature of the pollution generated by industrial, household and transportation sources. Two submodels compose the framework: (1) an industrial-household emissions submodel; and (2) a transportation emissions submodel. These submodels are fully operational and can be used at low cost to test and examine the pollution implications of a wide variety of assumptions on the nature and direction of economic and population growth on a regional or subregional basis. The submodels were applied to a representative set of seven urban regions to test the different effects of age, size, pollution control technology, and urban form in a marginal growth context. Included in this set were five existing New York State urban regions and two prototype, hypothetical cities. The importance of the transportation sector in marginal pollution analysis was clearly established. A method was developed for examining the transportation emissions implications which are both direct and indirect. This study resulted in considerable advances in data collection, analysis and management. Its analysis framework can be used for a variety of purposes in the formulation of environmental policy. (Bell-Cornell)
W76-11127

A MATRIX APPROACH FOR DETERMINING WASTEWATER MANAGEMENT IMPACTS,
Weston (Roy F.), New York.
K. J. Phillips, and J. A. DeFilippi.
Journal of the Water Pollution Control Federation, Vol. 48, No. 7, p 1759-176, July 1976. 5 fig, 3 tab, 4 ref.

Descriptors: *Waste water(Pollution), *Management, Evaluation, Project planning, Equations, Systems analysis, Methodology.
Identifiers: *Matrix approach, *Environmental impact.

A methodology is developed and demonstrated to quantify and rank the relative environmental impacts of alternative wastewater management systems. The approach first identifies and objectively assigns weights to various environmental categories. Project components are then listed and relative environmental impacts are calculated for each environmental category by using functional relationships. The results are incorporated into a matrix and a final relative environmental impact is numerically calculated for each alternative. The approach was initially developed for water resources projects, but it has been modified and adopted to evaluating wastewater management systems. (Bell-Cornell)
W76-11128

POLITICAL RESOLUTION OF ENVIRONMENTAL CONFLICTS,
Waterloo Univ. (Ontario). Dept. of Systems Design.
For primary bibliographic entry see Field 6G.
W76-11129

FEM COUPLED WITH LP FOR WATER POLLUTION CONTROL,
Hiroshima Inst. of Tech., Itsukaichi (Japan).
For primary bibliographic entry see Field 5B.
W76-11134

COST SHARING TO INDUCE EFFICIENT TECHNIQUES OF ABATING WASTEWATER POLLUTION,
National Bureau of Standards, Washington, D.C., Building Economics Section.
H. E. Marshall, and R. T. Ruegg.
Journal of Environmental Economics and Management, Vol. 2, No. 2, p 107-119, December 1975. 5 tab, 3 equ, 13 ref.

Descriptors: *Waste water(Pollution), *Cost sharing, *Pollution abatement, *Water quality control, Evaluation, Effects, Measurement, Equations, Operation and maintenance, Costs, Optimization, Constraints, Systems analysis.
Identifiers: Bias, Least-cost, Benefit maximization.

This paper analyzes existing cost-sharing rules for wastewater pollution grants administered by the Environmental Protection Agency under the 1972 Amendments to the Federal Water Pollution Control Act. It identifies and measures biases in the existing cost-sharing rules that encourage nonfederal interests to select particular techniques (e.g., capital-intensive techniques) over others even when the selected techniques are not the least costly to the nation. The paper develops theoretically a cost-sharing condition -- that the same percentage cost share be applied to all abatement techniques -- that would eliminate the cost-sharing bias. Alternative cost-sharing approaches are evaluated in terms of their biasing effects and their absolute dollar costs for federal and nonfederal project participants. In conclusion, existing rules for the cost sharing of wastewater pollution abatement appear to bias nonfederal interests toward particular techniques, expecially construction-intensive over operation and maintenance and land site-intensive techniques. (Bell-Cornell)
W76-11135

RESPONSE OF SOUTH PLATTE TO EFFLUENT LIMITATIONS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W76-11137

ESTIMATED COSTS OF MECHANICAL CONTROL OF WATER HYACINTHS,
Georgia Univ., Athens. Dept. of Agricultural Economics.
M. J. Mara.
Journal of Environmental Economics and Management, Vol. 2, No. 4, p 273-294, April 1976. 2 fig, 6 tab, 24 ref.

Descriptors: *Water hyacinths, *Water quality control, *Harvesting, *Dynamic programming, *Linear programming, Optimization, Constraints, Biology, Lakes, Size, Equations, Control, Marginal costs, Costs, Mathematical models, Systems analysis.
Identifiers: *Cost minimization, Infestation, Mechanical control, Control strategy, Operating policy.

Water hyacinths are detrimental to the environment in many ways, directly or indirectly affecting all people living in or using an area infested by the weeds. Presented is an application of dynamic linear programming for purposes of achieving the minimum cost strategy for the mechanical harvesting method of controlling water hyacinths in Florida. The optimization model was developed and applied to a hypothetical lake to determine the least-cost method and seasonal pattern of removal to attain specified levels of control. Results indicate that for a 400-acre lake under specified conditions, the annual costs of controlling water hyacinths run to $13,500 or $33.75 per acre. These costs increase as the initial amount of infestation from which geometric growth of the biomass occurs and/or the size of the water body increases. (Bell-Cornell)
W76-11141

DYNAMIC MODELLING AND CONTROL APPLICATIONS IN WATER QUALITY MAINTENANCE,
Cambridge Univ. (England). Dept. of Engineering.
M. B. Beck.
Water Research, Vol. 10, No. 7, 1976, p 575-595. 4 fig, 13 equ, 51 ref.

Descriptors: *Water quality control, *Systems analysis, *Hydrologic aspects, Technology, Instrumentation, Management, Rivers, Mathematical models, Operations research, Estimation, Equations, Water supply, Water distribution(Applied), Treatment facilities, Waste water treatment, Sewers, Networks, Urban runoff, Dissolved oxygen, Biochemical oxygen demand, Flow.
Identifiers: Biological processes.

A unified, systematic approach to problems of water quality management has been developed. A water quality system is defined as the following group of component features: the abstraction, purification, and supply of potable water from a river; consumer effluent, rainfall-runoff from an urban land surface, and the sewer network; the wastewater treatment plant; and the river itself. A systems analysis approach to the study of the dynamic and control aspects of the system is discussed, with particular reference to the practical limitations of instrumentation and technology. In an attempt to blend the theory with the practice, recent studies on the dynamic modeling and control of parts of the water quality system are reviewed. Special attention is paid to the practical application of techniques of system identification and parameter estimation. Finally, piecing together several individual results, it is possible to give a good indication of the manner in which control studies should be directed in the near future. It is concluded that of the modeling problems still remaining, the outstanding challenge to the dynamic systems analyst is that of biological process modeling: more attention must be given to the achievement of a proper understanding of, for example, the substrate/micro-organism relationships of activated sludge and anaerobic digestion, as applied to river water quality. (Bell-Cornell)
W76-11142

VILLAGE WATER SUPPLY, A WORLD BANK PAPER.
International Bank for Reconstruction and Development, Washington, D. C.
March 1976. 96 p, 19 tab, 14 ref.

Descriptors: *Water supply, *Rural areas, *Water quality, *Public health, Economics, Management, Investment, Projects, Water resources development, Costs, Benefits, Planning, *Domestic water, Water quality standards.
Identifiers: *World Bank(Washington DC), Developing countries, Villages.

The supply of water for domestic use in the rural areas of the developing world is considered. The rate at which access to safe water is being provided for these populations is too slow to keep pace with the birth rate. In these countries, waterborne or water-related diseases are among the three major causes of sickness and death. The World Health Organization considers that provision of a safe and convenient water supply is the single most important activity that could be undertaken to improve the health of people living in rural areas. The World Bank has been shifting the emphasis of its lending program so as to have a greater impact on the rural population through projects in agriculture and integrated rural development; rural water supply and sanitation should be a significant component of these projects. Because rural water supply has hitherto been largely neglected, experience and knowledge are lacking to set specific targets for action. As a first step, this paper concentrates on the problems peculiar to this subsector and suggests ways to begin to overcome the current state of neglect. (Bell-Cornell)
W76-11143

A STOCHASTIC PROGRAMMING MODEL APPLIED TO WATER RESOURCES MANAGEMENT,
Computing Center for Universities, Budapest (Hungary).

For primary bibliographic entry see Field 4A.
W76-11144

INTEGRATED CONTROL OF ALLIGATOR WEED AND WATER HYACINTH IN TEXAS.
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
Available from the National Technical Information Service, Springfield, Va 22161 as ADA-008 980 $3.50 in paper copy $3.00 in microfiche. Technical Report No. 9, March 1975. 112 p.

Descriptors: *Alligatorweed, *Aquatic weed control, *Water hyacinth, *Texas, Mechanical control, Herbicides, Diquat, 2,4-D, Biocontrol, Southeast U.S., Cost-benefit ratio, Application methods, Algal control, Pesticide drift, Emulsions, Pesticide residues, Insect control, Toxicity, Persistence, Environmental effects, Integrated control measures.
Identifiers: Phenoxy herbicides.

A program of control and eradication of economically undesirable aquatic plants in coastal and allied waters is essential. The Aquatic Plant Control Program was established in 1958 as a cooperative project between eight southeastern coastal states. Treatment of 200,000 acres of water hyacinth and alligator weed costs about $4,000,000 annually and yields almost $14,000,000 in benefits. Silvex, 2,4-D, endothall, and diquat are used to treat water hyacinth, alligator weed, water milfoil, Egeria, and Hydrilla. Average annual benefits are about $194,040 with a benefit-cost ratio of 6.7. The alligator weed flea beetle was used to reduce alligator weed and 2,4-D to control water hyacinth. Control of phenoxy herbicide spray droplet size reduces drift. Herbicides may be applied in water-in-oil (invert and bivert) emulsions. Control with herbicides is easier, faster, longer lasting, and less expensive than mechanical control. Toxicity, persistence, and decomposition of phenoxy herbicide residues are discussed. The aquatic plant control program in Texas is described. (See W76-11146 thru W76-11152) (Buchanan-Davidson-Wisconsin)
W76-11145

IMPACT STATEMENT FOR THE AQUATIC PLANT-CONTROL PROGRAM-STATE OF TEXAS,
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 6G.
W76-11146

AQUATIC PLANT CONTROL PROGRAM FOR ALLIGATOR WEED AND WATER HYACINTH IN TEXAS,
Texas Parks and Wildlife Dept. Houston.
R. N. Hambric, L. V. Guerra, D. M. Maddox, and E. O. Gangstad.
In: Aquatic Plant Control Program: Integrated Control of Alligator Weed and Water Hyacinth in Texas, Army Engineer Waterways Experiment Station, Vicksburg, Miss., Technical Report No. 9, March 1975, p C3-C13. 2 fig., 2 tab.

Descriptors: *Aquatic weed control, *Integrated control measures, Alligatorweed, Insects, Water hyacinth, Biocontrol, *Texas, Herbicides, Freshwater marshes, Community development, Reservoirs, Rates of application, Irrigation water, Water level fluctuations, Potable water, 2,4-D, Spraying, Pesticide drift.
Identifiers: Agasicles hygrophila.

Alligator weed flea beetles (Agasicles hygrophila) were released in alligator weed infestations in the Texas J. D. Murphree Wildlife Management Area, a natural freshwater marsh, and Dam B Reservoir. They established well and dispersed widely. Most alligator weeds suffered heavy feeding damage; only mats growing on the flats did not seem suitable for flea beetles because the weeds dried up during drawdowns or were flooded during high water. Natural factors limiting flea beetle populations are climatic. Frost eliminates the host plant's serial portions on which beetles feed, so populations are limited and insufficient beetles are present when the plant's growth cycle is most susceptible. Rapid water level change from rainfall and hurricane intensity winds are other abiotic factors. Water hyacinth was controlled by spraying with amine salts of 2,4-D. The butoxyethanol ester of 2,4-D was used in potable water sources. Spraying when crop production was at a minimum reduced damage from drifting. There were generally no harmful effects from control operations on water supplies. Aerial applications are made with concentrated formulations in invert emulsions or similar carriers to prevent drift. After initial clearing, maintenance may needed yearly for 4-5 years. When practicable, vegetation can be cut from anchorage and allowed to drift to salt water. (See also W76-11145) (Buchanan-Davidson--Wisconson)
W76-11147

FUNDAMENTALS OF DRIFT CONTROL BY DROPLET SIZE SELECTION,
Hercules Powder Co., Wilmington, Del. Synthetics Dept.
L. O. Hill.
In: Aquatic Plant Control Program: Integrated Control of Alligator Weed and Water Hyacinth in Texas, Army Engineer Waterways Experiment Station, Vicksburg, Miss., Technical Report No. 9, March 1975, p. D3-D8. 8 tab.

Descriptors: *Weed control, *Pesticide drift, *Drops(Fluids), *Herbicides, 2,4-D, Stoke's Law, Particle size, Application equipment, Application methods, Rates of application, Sprays, Emulsions.

Although 2,4-D is a very active, selective weed killer, it has caused much damage, largely due to drift. Droplet drift is the distance a crosswind will blow it in the time the droplet is falling. Stoke's Law can be used to predict drift, calculate rate of application, and determine the time it takes different droplet sizes to fall depending on crosswind speed and height it is sprayed from. Although larger particles drift less, droplet size also determines covering ability. Droplets large enough to contain drift but small enough to spray the required number of droplets per square inch to kill are generated by a bifluid spray system. No premixing is required as the herbicide concentrate becomes the oil phase. The nozzle contains the mixing chamber the energy created by swirling action inherent in the nozzle design inverts the emulsion from the water to the oil phase. This water-in-oil emulsion exhibits a plastic-type rheological behavior with a yield point of about 100 g's; which prevents further breaking once spherical droplets are formed. The invert droplet reduces water evaporation while the droplet is falling to the ground. Use of helicopters, fixed-wing airplanes, backpack sprayers, tractors, and blowers give great versatility to this spray system. (See also W76-11145) (Buchanan-Davidson--Wisconsin)
W76-11148

NEW TECHNIQUES IN VEGETATION MAINTENANCE ON MILITARY RESERVATIONS,
Stull Chemical Co., San Antonio, Tex.
D. P. Petersen, O. H. Hayes, and C. R. True.
In: Aquatic Plant Control Program: Integrated Control of Alligator Weed and Water Hyacinth in Texas, Army Engineer Waterways Experiment Station, Vicksburg, Miss., Technical Report No. 9, March 1975, p. E3-E12. 5 tab.

Descriptors: *Aquatic weed control, *Herbicides, *Brush control, *Weed control, *Grasses, *Emulsion, 2,4-D, Dalapon, Adjuvants, Spraying, Toxicity, Alligatorweed, Water Hyacinth, Pondweeds, Pesticide drift, Rates of application, Application equipment.
Identifiers: *Stull Bifluid System, Dicamba, Monosodium-methanarsonate, Bromacil, Ammonium sulfamate, Duckweed.

The Fourth Army uses water-in-oil (invert) herbicide emulsions for grounds maintenance containing either 2,4-D, dicamba, dalapon, monosodium-methanarsonate, bromacil, or ammonium sulfamate mixed with spray adjuvant plus diesel oil. Toxicant dose rates of some herbicides may be reduced because of greater confinement of spray to the target. Ammonium sulfamate and monosodium-methanarsonate in an invert emulsion base gives general vegetation control without soil contamination. It is effective on woody plant growth when applied heavily along fence lines and around buildings, poles, trees, etc. The Stull Bifluid System using adjuvants with phenoxy herbicides to control aquatic emergent weeds (alligator weed, duckweed, pondseed, water hyacinth) causes little water contamination and drift and the maximum amount of active herbicide is concentrated on target weeds. Single applications of phenoxy herbicides on susceptible emergent aquatic weeds were enough, but species susceptibility differed. Low volatile emulsifiable concentrates are recommended. Minimum application rates with small droplets should be used when drift is minimal, but maximum rates with large droplets should be used when drift is critical. How to select herbicide dose rates, water and oil premixes, and water to oil ratios; calculation of sprayer outputs; of metering orifices; and calibration of sprayers is shown. (See also W76-11145) (Buchanan-Davidson--Wisconsin)
W76-11149

HERBICIDES AS ANTIPOLLUTANTS,
Agricultural Research Service, Laramie, Wyo. Crops Research Div.
F. L. Timmons.
In: Aquatic Plant Control Program: Integrated Control of Alligator Weed and Water Hyacinth in Texas, Army Engineer Waterways Experiment Station, Vicksburg, Miss., Technical Report No. 9, March 1975, p. F3-F19. 7 tab.

Descriptors: *Aquatic weed control, *Herbicides, *Algal control, *Riparian plants, Copper sulfate, Potable water, Diquat, Sodium arsenite, 2,6-Dichlobenil, Monuron, Safety, 2,4-D, Submerged plants, Floating plants, Fish, Pesticide residues, Resistance, Irrigation water, Toxicity, Dalapon, Persistence, Agronomic crops, Hydrosols(Soils).
Identifiers: Dichlone, Acrolein, Endothall, Xylene, Petroleum oils, Fenac, Diuron, Ammonium sulfamate, Bromacil, Sodium TCA, Silvex.

Approximately 150 different aquatic or water weeds are considered pollutants; many convert inorganic nutrients into organic matter, remove carbon dioxide, add dissolved oxygen to water, are food sources or provide suitable habitats for fish, etc. Aquatic plant growth, density, vigor, and nutrient concentrations are increasing in most areas and causing problems. Twenty herbicides are registered for control of aquatic and bank weeds: copper sulfate and dichlone for algae; acrolein, diquat, endothall, petroleum distillate, sodium arsenite, dichlobenil, fenac, diuron, monuron, and ester formulations of silvex and 2,4-D for submersed seeds; diquat, silvex, and 2,4-D for floating aquatic weeds; and ammonium sulfamate, bromacil, dalapon, sodium TCA petroleum oils, silvex, and 2,4-D for emersed, marginal, or bank weed control. The amount and persistence of herbicide residues in water and fish can determine if a herbicide is a pollutant. Results on the persistence of 2,4-D, diquat, endothall, dichlobenil, fenac, and silvex in water and fish are presented. Studies are being conducted on herbicide residues in water, hydrosoil, and irrigated crops, their toxicities to animals and humans, and the presence and fate of possible harmful degradation products. (See also W76-11145) (Buchanan-Davidson--Wisconsin)
W76-11150

PHENOXY HERBICIDE RESIDUES AND THEIR PERSISTENCE,
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5B.

W76-11151

AQUATIC PLANT CONTROL PROBLEMS AT SAM RAYBURN RESERVOIR,
Army Engineer District, Fort Worth, Tex.
E. Mayer.
In: Aquatic Plant Control Program: Integrated Control of Alligator Weed and Water Hyacinth in Texas, Army Engineer Waterways Experiment Station, Vicksburg, Miss., Technical Report No. 9, March 1975, p. H3-H11. 1 fig.

Descriptors: *Aquatic weed control, *Herbicides, *Texas, Water hyacinth, Alligatorweed, 2,4-D, Emulsions, Spraying, Mosquitoes, Reservoirs, Biocontrol, Economic impact.
Identifiers: Silvex, Agasicles hygrophila, *Sam Rayburn reservoir(Tex).

The Town Bluff Dam-B. A. Steinhagen Lake and the Sam Rayburn Reservoir, Texas, have serious problems with water hyacinth and alligator weed growth. The proposed control program will consist of an initial treatment in the fall, with concentrated treatment in the spring, and follow-up treatment later. The most efficient control agent appears to be 2,4-D; the alligator weed flea beetle has helped but not enough for complete control. It has been proposed to use a water solution of the amine salt or butoxyethanol ester of 2,4-D to control water hyacinth at both reservoirs (3000 acres) and an isoctyl or low volatile ester formulation of 2,4-D-trichlorophenoxyacetic acid (silvex) as a conventional spray or invert emulsion from rotary aircraft for alligator weed control in the B.A. Steinhagen Lake (1000 acres) in 1975. Control of these weeds would help prevent breeding of mosquitoes, make lakeside areas useable, prevent flooding caused by hyacinth mats, and increase recreational use. Use of herbicides should not cause safety hazards. Concentration of the chemicals should not occur. Usually these chemicals have not caused fish kills or decreased fishing success. (See also W76-11145) (Buchanan-Davidson--Wisconsin)
W76-11152

COST BENEFIT ANALYSIS AND WATER POLLUTION POLICY.
Urban Inst., Washington, D.C.
Environmental Protection Agency and Urban Institute Symposium, September 5-7, 1973, Annapolis, Md. H. M. Peskin and E. P. Seskin, editors. Published in 1975, 370 p, URI 77000. $5.95.

Descriptors: *Water pollution control, *Econometrics, *Cost-benefit analysis, *Theoretical analysis, *Evaluation, *Measurement, *Estimating, Water quality standards, Indirect benefits, Direct benefits, Intangible benefits, Intangible costs, Costs, Indirect costs, Institutional constraints, Industrial wastes, Environmental effects, Project benefits, Comprehensive planning, Future planning(Projected), Risks, Analytical techniques.

This volume contains the contributions to a symposium sponsored by the Environmental Protection Agency concerning the major problems involved in environmental cost-benefit analysis, together with a comprehensive editorial overview of its basic concepts. Discussions in Part One relate to the concepts of benefits in cost-benefit analysis with emphasis on water pollution control; a survey of the techniques for measuring the benefits of water quality improvement; institutional and conceptual thoughts on benefit studies. Part Two relates to cost methodology and measurement as detailed in costs of water quality improvement, transfer functions, and public policy; environmental policy costs and their definition, measurement, and conjecture; and estimates of industrial waterborne residuals control costs with a review of concepts, methodology and empirical results. Part Three deals with the future and uncertainty as detailed in valuing long-run ecological consequences and irreversibilities. Part Four considers policy issues and institutions as discussed in voting, cost-benefit analysis and water pollution policy; property-right specification and 'distribution' in cost-benefit analysis; individual project analysis vs. comprehensive planning; cost-benefit analyses of cost-benefit analysis; and the role of cost-benefit in policy making. (See W76-11154 thru W76-11166) (Auen-Wisconsin)
W76-11153

THE CONCEPT OF BENEFITS IN COST-BENEFIT ANALYSIS: WITH EMPHASIS ON WATER POLLUTION CONTROL ACTIVITIES,
Wisconsin Univ., Madison. Dept. of Economics.
R. H. Haveman, and B. A. Weisbrod.
In: Cost Benefit Analysis and Water Pollution Policy, Environmental Protection Agency and Urban Institute Symposium, September 5-7, 1973, Annapolis, Md. Published in 1975, p. 37-66. 1 fig., 31 ref.

Descriptors: *Water pollution control, *Cost-benefit analysis, *Benefits, *Evaluation, Welfare(Economics), Resource allocation, Equity, Direct benefits, Indirect benefits, Intangible benefits, Tangible benefits, Economic efficiency, Compensation.
Identifiers: Option value.

The fundamental meaning of 'benefits' is explored in connection with cost-benefit analysis of public activities, particularly as they apply to water pollution control. First, the conceptual issues of benefits are explored, followed by a discussion and analysis of the 'new welfare economics' which give the concept meaning; then the willingness-to-pay criterion is developed, particularly examining the relationships between benefits and the economic concepts of efficiency and equity. Secondly, the discussion focuses on efficiency and a determination of which types of benefits are or are not properly included in a correctly defined concept of efficiency benefits. Also discussed are the distinctions between primary and secondary benefits, real and pecuniary benefits, external and internal benefits, and tangible and intangible benefits. Then the issues of option price and option value, and donor benefits and equity effects are explored. The fundamental point stressed is the distinction between the 'real social' effects (benefits or costs of a project--those effects that expand the production and consumption potential for the entire society--and the 'pecuniary private' effects--those that do not expand the total potential, but rather, expand it for some persons and contract it for others. (See also W76-11153) (Auen-Wisconsin)
W76-11154

A SURVEY OF THE TECHNIQUES FOR MEASURING THE BENEFITS OF WATER QUALITY IMPROVEMENT,
Bowdoin Coll. Brunswick, Maine. Dept. of Economics.
A. M. Freeman.
In: Cost Benefit Analysis and Water Pollution Policy, Environmental Protection Agency and Urban Institute Symposium, September 5-7, 1973, Annapolis, Md. Published in 1975, p. 67-104. 7 fig., 37 ref.

Descriptors: *Cost-benefit analysis, *Water pollution control, *Benefits, *Measurement, *Estimating, Analytical techniques, Welfare(Economics), Econometrics.

The techniques for obtaining monetary measures of the benefits of water pollution control are described and evaluated. The three essential conditions which any technique of benefit estimation must meet if it is to fulfill the needs of water resource planners are: (1) The technique must lead to monetary measures of values or benefits; (2) it must be firmly based on economic theory and concepts of willingness-to-pay and of consumer and producer surplus; and, (3) that some measure of water quality explicity enters the analysis as a variable. A classification of benefits, with the techniques for estimating the kinds of benefit in each classification, is provided in terms of the ways in which changes in water quality enter into the economic processes to become or produce economic goods with values attached to them. The focus is on the necessity for establishing the relationship between changes in abatement levels, changes in quality parameters, and chages in the uses of water as a precondition to estimating the value of improved water quality. The imponderables are how to specifically relate abatement measures to quality changes and uses, the indices of water quality relevat to recreational uses, or how people will respond to changes in different quality parameters, and the links between the quality parameters and discharge rates. (See also W76-11153) (Auen-Wisconsin)
W76-11155

SOME INSTITUTIONAL AND CONCEPTUAL THOUGHTS ON THE MEASUREMENT OF INDIRECT AND INTANGIBLE BENEFITS AND COSTS,
Wisconsin Univ., Madison. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W76-11156

A SURVEY OF EMPIRICAL BENEFIT STUDIES,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6B.
W76-11157

COSTS OF WATER QUALITY IMPROVEMENT, TRANSFER FUNCTIONS, AND PUBLIC POLICY,
Resources for the Future, Washington, D.C.
A. V. Kneese.
In: Cost Benefit Analysis and Water Pollution Policy, Environmental Protection Agency and Urban Institute Symposium, September 5-7, 1973, Annapolis, Md. Published in 1975, p. 175-205. 7 fig., 2 tab., 19 ref.

Descriptors: *Cost-benefit analysis, *Water pollution control, *Water policy, *Costs, *Water quality standards, Estimating, Methodology, Industrial wastes, Environmental effects, Mathematical models, Regional analysis.
Identifiers: *Social costs, Opportunity costs, Effluent standards, Ambient standards, Streeter-Phelps equations, Transfer functions.

The discussion centers on the wide variations in the possible costs of controlling water quality. Costs depend upon the levels of water quality contemplated, the strategies envisaged for implementing management programs, the range of technologies admitted, and the restrictions set upon impacts on other environmental media. Detailed regional case studies have been particularly illuminating with respect to the cost-effectiveness of various implementation strategies. These studies have shown the inefficiency of uniform discharge reduction approaches, the potential of effluent charges for approximating least-cost distributions of discharge reduction at individual outfalls, the applicability and efficiency of a wide range of technologies in a regional river-basin context, and the importance of considering direct interdependencies between the various environmental media. These analyses were made possible by combining cost estimates, economic models, and transfer functions into coherent analytical devices. The national water quality control policy is found deficient, as contrasted with the major West European countries, little attention has been given to cost-effectiveness. Economic models are presented illustrating transfer functions for cost analysis, cost minimization and the location of discharges, and a multiple residuals regional management model. It is suggested that pollution control can be more ef-

fective when administered at a regional rather than a national level. (See also W76-11153) (Auen-Wisconsin)
W76-11158

ENVIRONMENTAL POLICY COSTS: DEFINITION, MEASUREMENT, AND CONJECTURE,
California Univ., Riverside.
R. C. D'Arge.
In: Cost Benefit Analysis and Water Pollution Policy, Environmental Protection Agency and Urban Institute Symposium, September 5-7, 1973, Annapolis, Md. Published in 1975, p. 207-229. 2 fig.

Descriptors: *Cost-benefit analysis, *Water pollution control, *Institutions, *Management, *Costs, Measurement, Water quality standards, Decision making, Pollution abatement, Planning.
Identifiers: *Policy costs.

Policy costs are defined as the costs of information, enforcement, and administration to achieve a public objective, such as water quality improvement, with emphasis on cost minimization. Besides the agency's general objectives it must identify the mandate, scope, objectives, and relevant processes of water quality management and the magnitude of its initial and expected budget. The considerations in the decision on objectives, mandate, and budget are typified and the measuring of policy costs examined within the context of a model based on the assumptions of that which is 'optimal' will vary according to the objectives of the constitutional body; and that this body will function at the Pareto-efficient point subject to its constraints; and by including the implications that distributional consequences are either not of concern to the institution or are resolved via lumpsum transfers or other means. The model and its underlying assumptions are examined in the light of the 'degree of directness' of control measures on the postulate that the degree of directness increases with a decline in the number of behavioral or technological interpositions between the control agency and private decisions. In the absence of linkages, controls (such as penalties and rules) become 'absolutely' direct. Some conditions which must be mandated for a water quality management authority to be viable and efficient are discussed. (See also W76-11153) (Auen-Wisconsin)
W76-11159

ESTIMATES OF INDUSTRIAL WATERBORNE RESIDUALS CONTROL COSTS: A REVIEW OF CONCEPTS, METHODOLOGY, AND EMPIRICAL RESULTS,
Johns Hopkins Univ., Baltimore, Md.
S. H. Hanke, and I. Gutmanis.
In: Cost Benefit Analysis and Water Pollution Policy, Environmental Protection Agency and Urban Institute Symposium, September 5-7, 1973, Annapolis, Md. Published in 1975, p. 231-268. 7 fig., 7 tab., 39 ref.

Descriptors: *Water pollution control, *Cost-benefit analysis, *Costs, *Estimating, *Industrial wastes, *Waste treatment, Methodology, Recycling, Byproducts, Optimization.

The Environmental Protection Agency-sponsored industrial pollution control studies are criticized because they cannot be used as ex ante policy guides in determining trade-offs between costs and benefits of appropriate levels of residuals discharges. Some of the major shortcomings of these studies are: The estimation of gross costs or expenditures rather than net residuals management costs are of little value in policy making and overstate the net resources that are foregone. End-of-pipe treatment has been considered the most efficient and/or the only means of controlling residuals without consideration of the product output and input variables, and of their influence upon costs. In-plant process changes that affect recovery and byproduct production--which, in turn, affect the effluents--have been given only cursory attention. The importance of single plant firm vs. the multiple plant firm has not been treated. The EPA studies have not dealt with the administrative and bureaucratic costs of implementing various types and levels of control, and which must be incorporated into the estimate of net residuals management costs. A proper methodology for dealing with these trade-offs in formulating residual discharge strategies is embodied in the studies conducted at Resources for the Future, which analyze the relevant factors that influence net residuals management costs and avoid the shortcomings usually implicit in considering industrial waste treatment costs. (See also W76-11153) (Auen-Wisconsin)
W76-11160

VALUING LONG-RUN ECOLOGICAL CONSEQUENCES AND IRREVERSIBILITIES,
Maryland Univ., College Park. Dept. of Economics.
For primary bibliographic entry see Field 6G.
W76-11161

COST-BENEFIT ANALYSIS, PROPERTY RIGHT SPECIFICATION AND 'DISTRIBUTION',
Rand Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 6B.
W76-11162

PROJECT-BY-PROJECT ANALYSIS VS. COMPREHENSIVE PLANNING,
Environmental Protection Agency, Washington, D.C.
F. H. Abel.
In: Cost Benefit Analysis and Water Pollution Policy, Environmental Protection Agency and Urban Institute Symposium, September 5-7, 1973, Annapolis, Md. Published in 1975, p. 333-339. 4 ref.

Descriptors: *Cost-benefit analysis, *Pollution abatement, *Regional analysis, *Comprehensive planning, Methodology.

The planning and implementation problems involved in choosing the scope of pollution abatement cost-benefit analysis, both with respect to the geographic area to be included in the analysis and the number of pollutants to be considered are discussed. It is recommended that an area in which significant social, economic, and political interdependencies form a relatively self-contained unit, and that the environmental plan for the unit should include all major pollutant categories: air, water, solid waste, and hazardous materials. The cost-benefit analysis should be based on a single pollutant, media, or multimedia and multipollutant basis depending on synergism among pollutants and the degree to which the control technology can be refined. The level of detail for comprehensive analysis and the ability to aggregate for regional analysis, at a minimum, should include the flow of residuals into the area, generation and assimilation of residuals within the area, and the flow of residuals from the area, and should also quantify the effects of these residuals and the costs of control functions for all sources. When analyzing multiple-objectives, a single cost-benefit ratio may not be the most meaningful or useful result because any proposed program may affect the objectives in different ways. However, a single ratio can be obtained if the costs and the benefits of the different objectives are weighed. (See also W76-11153) (Auen-Wisconsin)
W76-11163

COST-BENEFIT ANALYSES OF COST-BENEFIT ANALYSIS,
California Univ., Riverside. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W76-11164

THE ROLE OF COST-BENEFIT ANALYSIS IN POLICY MAKING,
Stanford Univ., Calif.
For primary bibliographic entry see Field 6B.
W76-11165

VOTING, COST-BENEFIT ANALYSIS, AND WATER POLLUTION POLICY,
Resources for the Future, Washington, D. C.
P. R. Portney.
In: Cost Benefit Analysis and Water Pollution Policy, Environmental Protection Agency and Urban Institute Symposium, September 5-7, 1973, Annapolis, Md. Published in 1975, p. 293-311. 5 fig., 31 ref.

Descriptors: *Cost-benefit analysis, *Water pollution control, *Political aspects, *Social participation, *Decision making, Resource allocation, Cost sharing, Income distribution, Public benefits, Benefit sharing.
Identifiers: Voting franchise.

The role of political mechanisms in the allocation of resources to water quality program is discussed, with special attention directed to the uses of referendum voting by individuals and the uses of legislative voting (and votetrading) by elected representatives. The nature of water quality programs and the reasons why the market cannot provide a satisfactory allocation of resources, and the way in which individual voting might help choose the optimal level of output of an essentially indivisible 'social good', like water quality, are examined. Also examined is how legislative voting may be expected to alter patterns of resource allocation, especially in the area of water quality. The conclusions are that it is unreasonable to believe that individual voting can lead to the optimal level of water quality unless symmetrical distribution of preferences is produced and the costs of social goods are equally allocated by income redistribution through explicit taxes and transfers. The increased use of referenda is an indication of dissatisfaction with the results of cost-benefit analysis, either due to inaccuracies or to perverse distributional effects. The proper sphere of water quality management is in federal, state, or local legislative bodies in conjunction with other issues of concern, as those responsible for water quality decision should also be those that are equally responsible for decisions on other social goods. (See also W76-11153) (Auen-Wisconsin).
W76-11166

EFFECT OF TILLAGE SYSTEMS ON RUNOFF LOSSES OF PESTICIDES: A SIMULATED RAINFALL STUDY,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W76-11169

PROCEEDINGS OF THE SOUTHEASTERN CONFERENCE ON WATER SUPPLY AND WASTEWATER IN COASTAL AREAS,
North Carolina Water Resources Research Inst., Raleigh.
For primary bibliographic entry see Field 5D.
W76-11224

SOME PRACTICAL PROBLEMS IN DEVELOPING AND PRESENTING ENVIRONMENTAL QUALITY INDICES TO THE PUBLIC,
Environmental Protection Agency, Seattle, Wash. Region X.
L. E. Coate, and A. K. Mason.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 31-2-1 - 31-2-4. 1 tab.

Descriptors: *Indicators, *Data processing, *Water quality, *Evaluation, Rivers, Regional analysis, Water pollution effects, Measurement, Monitoring, *Water quality standards.

Identifiers: Environmental indices.

The rationale for selecting specific environmental quality indices is presented along with an example of the establishment of a regional water quality index. Guidelines for the adoption of indices include: their ability to be understood by the public, their ability to relate to standards or legislative goals as well as to health and lifestyle; their flexibility for updating, and their usefulness for assisting in program management and resource allocation. An example of the application of these guidelines is presented in the form of a water quality index which is based on the percentage of the river or river miles meeting water quality standards. The index involves the utilization of 10 pollution categories: dissolved oxygen, temperature, pH, aesthetics, total dissolved gases, total dissolved solids, radioactivity, pathogens, organic toxicants, and inorganic toxicants. The criterion used for determining whether a violation exists is the state-established health standard for that particular river at a given location. (See also W76-10637) (Kreager-FIRL)
W76-11246

TOWARDS A COMPUTER-BASED INFORMATION MONITORING SYSTEM FOR GROUNDWATER DATA IN NEW ZEALAND,
Illinois Univ. at Chicago Circle. Dept. of Geological Sciences.
For primary bibliographic entry see Field 4B.
W76-11247

PROCEEDINGS OF THE ANNUAL CONFERENCE, ONTARIO SECTION, AMERICAN WATER WORKS ASSOCIATION; POLLUTION CONTROL ASSOCIATION OF ONTARIO; AND ONTARIO MUNICIPAL WATER ASSOCIATION.
For primary bibliographic entry see Field 5F.
W76-11249

PROCEEDINGS OF THE THIRD NATIONAL CONFERENCE ON COMPLETE WATERUSE: SYMBIOSIS AS A MEANS OF ABATEMENT FOR MULTI-MEDIA POLLUTION,
For primary bibliographic entry see Field 5D.
W76-11257

PRELIMINARY INVESTIGATIONS OF A HEADWATER CREEK IN EASTERN KENTUCKY,
Virginia Commonwealth Univ., Richmond. Dept. of Biology.
G. L. Samsel, Jr., J. R. Reed, and R. R. Daub.
Trans Ky Acad Sci. 34(1/2); p 13-21, 1973.

Descriptors: *Kentucky, *Streams, Algae, Fish, *Baseline data collections, *Erosion, Sedimentation, Primary productivity, *Pre-impoundment, Recreation, Water quality, Nutrients.
Identifiers: *Rich Creek(Kent).

Investigations of a headwater stream, Rich Creek, in south-central Lawrence County, Kentucky, were initiated to ascertain the feasibility of impounding this water for construction of an environmentally controlled recreational reservoir. In addition, baseline data were gathered to facilitate studies on effects of sedimentation and erosion. Data collected on physical and chemical parameters, algae, fish, and bottom fauna, as well as primary productivity, indicated that Rich Creek was an undisturbed, headwater stream. Floral and fauna composition and relative abundance indicated good water quality. Nutrient values and primary productivity were low, and in general all parameters analyzed were indicative of a moderate flow, clean, headwater stream which would provide good quality water for a recreational impoundment.--Copyright 1974, Biological Abstracts, Inc.
W76-11284

CHLORIDE BUILD-UP AND CONTROL IN LAKE ERIE,
State Univ. of New York at Buffalo.
For primary bibliographic entry see Field 5B.
W76-11318

FEASIBILITY OF CHLORINATING FEEDLOT RUNOFF TO MEET BACTERIAL WATER QUALITY STANDARDS,
Maryland Univ., College Park. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W76-11334

EFFECTS OF WATER QUALITY ON THE RECREATIONAL USE OF WATER IN SOUTH EAST TEXAS,
Lamar Univ., Beaumont, Tex. Dept. of Industrial Engineering.
J. J. Brennan, G. Gates, and C. Carruth.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 585, $4.50 in paper copy, $3.00 in microfiche. Completion Report, July, 1976, 58 p, 5 fig, 19 tab. 27 ref. 2 append. OWRT B-195-TEX(1), 14-31-001-5118.

Descriptors: *Recreation, Swimming, Water quality, Estuarine environment, *Attitudes, Water skiing, Gulf of Mexico, *Texas, Cities, Water quality standards, *Water sports(Tex).
Identifiers: *Neches River(Tex), Beaumont-Port Arthur-Orange(Tex), Sabine Lake(Tex).

The estuarine segment of the Neches River in South East Texas flows through the middle of a metropolitan area. It is under-utilized for direct contact, water-based recreation. A public opinion poll of the general populus revealed that 66% participated in swimming and/or skiing in lakes and streams in the region, however only 45% of those had so used the Neches in the recent past. Of those who had used the Neches, 50% said they would not do so again. Reason for these attitudes are explored and compared to measured water quality parameters. Another survey of people actually using the river was made. Their responses and attitudes were compared to measured water quality parameter. Effects of historical, well-founded prejudices and media reports of recent violations on attitudes are discussed.
W76-11335

THE IMPACT OF VACATION HOMES ON NATIONAL FOREST WATER RESOURCES,
Arizona State Univ., Tempe. Coll. of Engineering Sciences.
B. A. Segall.
Eisenhower Consortium Bulletin, No. 3, 19 p, April, 1976. 4 fig, 12 ref, 9 tab.

Descriptors: *Recreation wastes, *Forests, Water resources, *Sewage effluents, *Water quality, Water pollution sources, Wastes, *Arizona, Waste water disposal, Waste water treatment, Water pollution control, Sewerage, Soil disposal fields, Environmental effects, *National Forests.

Wastewater disposal studies in northern Arizona were undertaken to determine the impact of second homes and related vacation development on streams in semiarid regions. The investigation showed that sewage flow rates are dependent upon home occupancy and fluctuate widely in comparison with suburban and urban areas. This sporadic waste discharge is deleterious to package type treatment plant systems. Dispersed well-designed and maintained soil disposal systems are preferred in a forest environment. Conventional sewerage systems and treatment plants concentrate wastewater flows, partially treat waste materials, and are less desirable. (Witt-IPC)
W76-11366

STATUS OF THE NPDES (NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM) IN THE SOUTHEAST,
Environmental Protection Agency, Atlanta, Ga. Region IV.
P. J. Traina.
In: TAPPI Environmental Conference, Atlanta, Georgia, April 26-28, 1976, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 5-8.

Descriptors: *Pulp and paper industry, *Southeast U.S., *Federal Water Pollution Control Act, Regulation, Legislation, Water Quality Act, *Water pollution control, Permits, Water quality control, *Water quality standards, *Pulp wastes.
Identifiers: *National Pollutant Discharge Elimination System(NPDES).

The 1972 Amendments to the Federal Water Pollution Control Act established the National Pollutant Discharge Elimination System (NPDES) to be administered by the U.S. Environmental Protection Agency. This national permit program is designed to control the discharge of all pollutants into the nation's waters. It establishes a tight regulatory system with precise and detailed abatement requirements, enforcement procedures, and penalties for violation. The mechanisms by which NPDES discharge permits are issued and for determining compliance are described. In the southeastern EPA regional area (which covers the 8-State region of Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee), compliance with NPDES permits among the pulp and paper industry is exceptionally high. Some 95% of the mills are in compliance with their schedules, and some 80% are in compliance with their discharge limits as set forth in the 1977 requirements of the Water Pollution Control Act. (Witt-IPC)
W76-11371

POLLUTION MANAGEMENT IN THE PAPER AND PAPERBOARD INDUSTRY.
Paper, Vol. 184, No. 12, p 730-731, 733, December 22, 1975. 1 fig.

Descriptors: *Pulp and paper industry, *Pollution abatement, Water pollution sources, Surveys, Planning, Economics, Operating costs, Operating and maintenance, Waste water treatment, Costs, Foreign countries, Europe.
Identifiers: *Closed systems, England.

The results of a 4-year survey of closed paper and board machine systems by the Environmental Protection Unit of the Research Association for the Paper and Board, Printing and Packaging Industries (England) are presented. During its investigation, the association assisted several mills in their planning and in the implementation of closed systems. Typical problems likely to be faced by mills in closing up a system are considered, and the economics of saveall operation and effluent treatment are discussed briefly. (Witt-IPC)
W76-11400

AGRICULTURE AND CLEAN WATER-PROCEEDINGS OF A CONFERENCE TO EXPLORE CONTROL STRATEGY FOR AGRICULTURAL NONPOINT SOURCE WATER POLLUTION.
Report EPA 600/9-75-005, August 1975. Conference held in Kansas City, Missouri, April 3, 1975, 153 p. Sponsored by Midwest Research Institute and Environmental Protection Agency.

Descriptors: *Water pollution control, *Water quality, *Legal aspects, Farm wastes, Sediment control, Soil conservation, Erosion, Planning, Agricultural runoff.
Identifiers: *Nonpoint source pollution, Plant nutrients, Control planning.

The conference was held to promote a constructive dialogue on the development of plans for the

control of agriculture related nonpoint source pollution arising from sediment erosion, fertilizer runoff, livestock wastes and pesticide residues. The morning session was devoted to an analysis of the state of the art on nonpoint source pollution related to agriculture with presentations on: (1) regional aspects and viewpoints; (2) agricultural pollution control; (3) technical basis of control; (4) conservation districts; (5) soil conservation; and (6) plant nutrients. The luncheon session was concerned with an economic overview, consisting of an address on economic problems and opportunities of pollution control. The afternoon session was designed to explore elements of control strategy planning for nonpoint pollution from agricultural sources with papers on: (1) the states' role; (2) one state's approach; and (3) the role of the farmer and agribusiness. The afternoon session was concluded with a panel discussion on the development of a practicable agricultural pollution control plan. Over 175 individuals from 20 states representing local, state, regional, and federal agricultural and environmental agencies attended the conference. Also, included in the 75 different organizations represented at the conference were attendees from farmer associations, educational institutions, and agribusiness. (See also W76-11407 thru W76-11408) (East Central)
W76-11406

STATES ROLE IN FORMULATING CONTROL STRATEGY,
Kansas State Board of Health, Topeka. Div. of Environmental Health.
D. F. Metzler.
In: Report EPA 600/9-75-005, August 1975. Agriculture and Clean Water--Proceedings of a Conference to Explore Control Strategy for Agricultural Nonpoint Source Water Pollution, Kansas City, Missouri, April 3, 1975, p. 83-92.

Descriptors: *Sediments, *Water pollution control, Agriculture, Nitrogen, *Kansas, *Coliforms, *Farm wastes, Water quality standards.
Identifiers: Fecal coliforms.

In the Kansas area, the problem of controlling agricultural pollution is caused by too much sediment and too much nitrogen. In order to develop a strategy which is rational in controlling the pollution, one should ask--does it affect human health, is it needed because it affects human health, is it needed because it improves the quality of fish or wildlife, or is it needed in order to control algal growth or the growths of weeds. Every river basin is different and different control strategies are required. Most of the time, all the major streams within Kansas are in compliance with the standards which Kansas has adopted and which are a part of the standards filed with EPA. The total dissolved solids concentration and the fecal coliform content represent the areas of most frequent violation. Fecal coliform violations occur usually as a result of rainfall and excessive runoff or snowmelt and the accompanying runoff. The fecal coliform standard was violated approximatey 25 percent of the time directly as a result of nonpoint source runoff. The fecal coliform effluent limitation for treated domestic wastewater discharges is 200 fecal coliform per 100 ml, and this is an extremely stringent limit; few wastewater discharges in Kansas now meet it. However, at low stream flow, the fecal coliform standards of 400/100 ml in Class A waters and 2,000/100 ml in Class A waters and 2,000/100 ml in Class B waters are rarely violated. The solution to the control problem requires careful planning a rational approach, and a major financial commitment on the part of the agricultural industry, and government. (See also W76-11406) (Cameron-East Central)
W76-11408

HYPOLIMNION OXYGENATION,
Union Carbide Corp., New York. (Assignee).
A. W. Fast, W. E. Grunert, and J. J. Pietruszewski.
U.S. Patent No. 3,956,124, 8 p, 4 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 946, No 2, p 730, May 11, 1976.

Descriptors: *Patents, *Water treatment, *Hypolimnion, *Stratification, *Oxygenation, *Thermal stratification, Lakes, Bottom water, Water pressure, Equipment, Conduits, Impoundments.

A lake or impoundment may be sufficiently deep to stratify thermally during the warm season of the year as the surface layers of water rise in temperature. Due to a relatively high biological oxygen demand, the dissolved oxygen level in the hypolimnion drops to a low level unfavorable to the ecology of the body of water. Whereas the DO deficiency is caused by the high biological oxygen demand, its development and persistence is dependent upon natural thermal stratification which in effect isolates the bottom water from the source of atmospheric oxygen at the surface. It is usually desirable to preserve thermal stratification in lakes and reservoirs. This invention relates to a process for oxygenating the hypolimnion of thermally stratified water bodies with high purity oxygen gas, using side stream pumping, without destroying the thermal stratification. In the process water is withdrawn from the hypolimnion at a rate of 10-200 percent of the hypolimnion volume per month, pressurizing the withdrawn water to superatmospheric pressure below 125 psig, injecting at least 80 percent oxygen gas at a rate of 5-300 lbs. 02 per million pounds withdrawn water but less than a rate to result in 02 supersaturation at the remixing point, returning the mixture through conduit means and remixing it at a rate to produce specified frictional head loss. (Sinha-OEIS)
W76-11454

DOCUMENTATION FOR ES001. A STEADY-STATE, ONE DIMENSIONAL, ESTUARINE WATER QUALITY MODEL,
Environmental Protection Agency, New York. Region II.
For primary bibliographic entry see Field 5B.
W76-11460

PROCEEDINGS OF THE SYMPOSIUM ON OFFSHORE OIL POTENTIAL AND RELATED LAND USE IMPACTS IN THE CENTRAL CALIFORNIA COASTAL ZONE.
California Univ., Santa Cruz, Coastal Marine Lab.
For primary bibliographic entry see Field 6G.
W76-11461

TEXAS COASTAL MANAGEMENT PROGRAM. HEARING DRAFT. EXECUTIVE SUMMARY.
Texas General Land Office, Austin.
For primary bibliographic entry see Field 6B.
W76-11465

TEXAS COASTAL MANAGEMENT PROGRAM. HEARING DRAFT.
Texas General Land Office, Austin.
For primary bibliographic entry see Field 6B.
W76-11466

TEXAS COASTAL MANAGEMENT PROGRAM. HEARING DRAFT. APPENDICES.
Texas General Land Office, Austin.
For primary bibliographic entry see Field 6B.
W76-11467

FLORIDA COASTAL POLICY STUDY: THE IMPACT OF OFFSHORE OIL DEVELOPMENT,
Florida State Univ., Tallahassee. Dept. of Urban and Regional Planning.
For primary bibliographic entry see Field 6G.
W76-11468

INTRODUCTION,
Florida State Univ., Tallahassee. Dept. of Urban and Regional Planning.
For primary bibliographic entry see Field 6G.
W76-11469

BUREAU OF LAND MANAGEMENT'S ENVIRONMENTAL STUDIES PROGRAM FOR THE SOUTH ATLANTIC OUTER CONTINENTAL SHELF AREA. CONFERENCE/WORKSHOP PROCEEDINGS,
Research Triangle Inst., Research Triangle Park, N. C.
For primary bibliographic entry see Field 6G.
W76-11474

FRAMEWORK FOR BUREAU OF LAND MANAGEMENT PROGRAMS,
Bureau of Land Management, Washington, D.C. Outer Continental Shelf Environmental Studies Program.
For primary bibliographic entry see Field 6G.
W76-11476

THE ALASKAN OUTER CONTINENTAL SHELF ENVIRONMENTAL ASSESSMENT PROGRAM,
National Oceanic and Atmospheric Administration, Boulder, Colo. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W76-11478

ENVIRONMENTAL PROTECTION AGENCY'S ROLE, INTERESTS, AND RESPONSIBILITIES WITH RESPECT TO THE OUTER CONTINENTAL SHELF DEVELOPMENT,
Environmental Protection Agency, Johns Island, S. C. Office of Research and Development.
For primary bibliographic entry see Field 6G.
W76-11479

OFFSHORE OPERATIONS, REGULATION AND ENVIRONMENTAL PROTECTION,
Exxon Co., New Orleans, La. Southeastern Div.
For primary bibliographic entry see Field 6G.
W76-11480

OVERVIEW OF CONFERENCE PROGRAMS,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 6G.
W76-11481

CONCLUSION AND RECOMMENDATIONS CONFERENCE/WORKSHOP,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 6G.
W76-11485

HYGIENIC EVALUATION OF AN EPOXY COMPOUND AND THE POSSIBILITY OF ITS USE IN SUBMERSIBLE ELECTRIC PUMPS FOR DOMESTIC PURPOSES, (IN RUSSIAN),
Kiev Research Inst. of General Communal Hygiene (USSR).
For primary bibliographic entry see Field 5C.
W76-11528

THE IMPORTANCE OF INHIBITING SUBSTANCES IN THE CONTROL OF ALGAL AND BACTERIAL POPULATIONS OF MARINE PLANKTON, (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
B. R. Berland, D. J. Bonin, and S. Y. Maestrini.
Mem Biol Mar Oceanogr. 4(3), p 63-100, 1974.

Descriptors: *Bacteria, Inhibition, Plankton, Algae, Biocontrol, *Algal control, Reviews, Sea water, Marine animals.

Identifiers: *Telluric bacteria.

The literature on inhibiting extracellular substances produced by marine algae and bacteria is reviewed, with a view to ascertaining their importance in the control of natural populations. Numerous planktonic species are able to produce these substances, but none of the data reported, including those obtained with chemically purified substances, indicate that they play an important role. The significance of antibiosis seems in fact to be over-rated. The antibacterial activity of sea water against telluric bacteria carried to the sea by rainfalls or sewage should be considered as 1st resulting from inimical heavy metals ion activity and from their lack of ability to take up the organic substrates, because of their very low concentration in sea water. Thus, telluric bacteria are unable not only to compete with natural marine bacteria, but also to survive for a long time. The substances released by plankton, especially by algae, are taken up only by marine bacterial strains, which prevent their accumulation so that telluric bacteria usually remain starved. Marine algae and bacteria seem to be rarely inhibited by antagonistic metabolites, because the cell densities are not high enough to release the necessary quantities for an activity level. Grazing and competition for nutrients are the most important factors in controlling algal and bacterial populations.--Copyright 1975, Biological Abstracts, Inc.
W76-11542

POSSIBILITY OF USING PHENOLIC RESINS IN HOUSEHOLD AND DRINKING WATER SUPPLY SYSTEMS, (IN RUSSIAN),
Vsesoyunznyi Nauchno-Issledovatelskii Institut Gigieni i Toksikologii Pestitsidov, Kiev (USSR).
For primary bibliographic entry see Field 5C.
W76-11560

HYGIENIC PROBLEMS OF LARGE ANIMAL CONFINEMENT,
Universitaet Hohenheim (Landwirtschaftliche Hochschule). (West Germany). Animal Health Dept. (I).
D. Strauch.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med 159(4), p 409-423, 1974.

Descriptors: *Farm wastes, *Confinement pens, *Public health, *Human diseases, Fertilizers, Microorganisms, *Bacteria, Water pollution control, Waste disposal, Legal aspects, Disinfection, Odor.
Identifiers: Antibiotics.

Keeping animals in large confinements creates special problems in epidemiology of infectious diseases and environmental protection. Epidemiologicl questions are closely connected with the excrements of animals. Chemical disinfection of physical treatment of animal manure can help to prevent spread of infectious microorganisms by using the excrements as fertilizer. The odor nuisances caused by the manure are linked to the use of too large amounts of slurry on agricultural fields by which damage is done to the soil and the plants. Hygienic problems are also created by feeding antibiotics to animals which may cause infectious resistance in various types of bacteria. The influence of untreated effluents on the receiving surface waters or ground waters must be considered from the point of view of water pollution. The same is true for the hygienic disposal of animal carcasses or parts of them in an adequate system of rendering plants. Governmental authorities are, by legislation, trying to get the nuisances of the environment caused by large animal confinement units under control.--Copyright 1976, Biological Abstracts, Inc.
W76-11571

MERCURY IN LAUNDRY WASTEWATERS,
Illinois Inst. for Environmental Quality, Chicago.
For primary bibliographic entry see Field 5D.
W76-11602

REVIEW OF STANDARDS AND OTHER INFORMATION ON THERMOPLASTIC PIPING IN RESIDENTIAL PLUMBING,
National Bureau of Standards. Washington, D. C.
For primary bibliographic entry see Field 8G.
W76-11603

DATA MANAGEMENT: KEY TO ENVIRONMENTAL QUALITY ASSESSMENT,
National Oceanic and Atmospheric Administration, Washington, D. C. Environmental Data Service.
T. S. Austin.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 25-1-1 - 25-1-4. 1 ref.

Descriptors: *Data collections, *Data processing, *Data transmission, *Information exchange, *Information retrieval, *Monitoring, Programs, Measurement, *Pollutant identification, Remote sensing, Methodology.

An evolving generic concept for an integrated data management system designed for investigating pollution of the marine environment is outlined. The concept incorporates knowledge and experience gained in large-scale, interdisciplinary data collection and interpretation programs such as the Barbados Oceanographic and Meteorological Experiment, the International Field Year for the Great Lakes program, American programs during the International Decade of Ocean Exploration, the Atlantic Tropical Experiment of the Global Atmospheric Research Program, and the development of a National Oceanic and Atmospheric Administration environmental quality monitoring plan for proposed oil and gas activities on the United States Continental Shelf. An international marine pollution monitoring pilot project known as the Integrated Global Ocean Station System is also described. The project involves a cooperative system for the unrestricted international exchange of ocean data, information, and services. Data are collected by 78 participating countries and are transmitted to users through the Global Telecommunication System. The rapidly developing role of remote sensing via satellite is also discussed. (See also W76-10637) (Kreager-FIRL)
W76-11607

A PRACTICAL DATA MANAGEMENT SYSTEM FOR MONITORING AND MANAGING LARGE DISTRIBUTED ECOSYSTEMS,
Michigan State Univ., East Lansing. Dept. of Electrical Engineering and Systems Science.
P. D. Fisher, and J. R. Cruitt.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 25-5-1 - 25-5-6. 2 fig, 2 tab, 5 ref.

Descriptors: *Data collections, *Data processing, *Information retrieval, *Monitoring, *Watershed management, Computers, Water quality control, Methodology, Pollutant identification, *Ecosystems.

A data management system which has many of the operational characteristics of the Environmental Protection Agency's Water Quality Control Information System is described for the monitoring and managing of large distributed ecosystems such as major watersheds. Data for the system are organized according to date, location, and parameter menonic. The system presently contains over 200 defined stations and over 1000 defined parameters. Raw data are being routinely put into the system at a rate of more than 250,000 entries/year. The system includes four possible output format options, including a format suitable for insertion into the Environmental Protection Agency's Water Quality Control Information System. Data are organized and temporarily stored on disc and then periodically moved to magnetic tape. The data management system is well suited for a medium-sized computer facility and for the on-line management of ecosystems in which throughput data delays of not more than 24 hours are required for data collected in situ and 2 weeks for data which must pass through analytical laboratories. (See also W76-10637) (Kreager-FIRL)
W76-11608

THE ROLE OF ENVIRONMENTAL DATA BANKS IN ENERGY RESOURCE DEVELOPMENT,
Kentucky Univ., Lexington. Inst. for Mining and Minerals Research.
J. E. Jones, and G. E. Smith.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 25-6-1 - 25-6-5. 8 tab, 13 ref.

Descriptors: *Data collections, *Information retrieval, *Industrial wastes, *Information exchange, *Pollutant identification, Surface waters, Groundwater, Heat, Heat transfer, Energy conversion, Coals, Kentucky.
Identifiers: Coal conversion plants.

The Environmental Data, Information, and Literature Bank being developed by the University of Kentucky for assessing the environmental, social, and economic aspects of producing clean fuels from coal is described. The data bank is designed to promote information exchange between other related governmental and private projects and the energy development community. Environmental impacts of interest to the environmental data bank include those associated with air, water, noise, and solid waste pollution. Specific data will be collected on surface water and subsurface water contamination and the generation and transfer of heat to water resources. The data bank is viewed as a necessary and integral part of the total energy development program in Kentucky since each coal conversion plant will be required to prepare an environmental impact statement. (See also W76-10637) (Kreager-FIRL)
W76-11609

SAMPLE TRACKING DATA MANAGEMENT SYSTEM,
Environmental Monitoring and Support Lab., Las Vegas, Nev.
For primary bibliographic entry see Field 7C.
W76-11611

QUALITY CONTROL AND HARMONIZATION PROGRAMMES FOR THE ASSESSMENT OF EFFECTS AND THE MEASUREMENT OF ENVIRONMENTAL POLLUTION IN THE EUROPEAN COMMUNITIES,
Commission of the European Communities, Luxembourg. Health Protection Directorate.
P. Recht, J. Smeets, R. Amavis, and A. Berlin.
In: International Conference Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 36-1-1 - 36-1-4. 4 tab.

Descriptors: *Quality control, *Water quality, *Europe, *Program, *Analytical techniques, Measurement, Evaluation, Surface waters, Potable water, Pollutant identification, Phenols, Sampling, Microbiology, Chemical properties, Phenols.
Identifiers: Collaborative testing.

Quality control and comparative programs dealing with the measurement of environmental pollution throughout the European Communities are discussed. Currently about 450 analytical laboratories are involved in 20 programs involving the collaborative testing of different analytical procedures. A collaborative study on the biologi-

cal assessment of surface water quality has been initiated to compare the methods of sampling, analysis, and data assessment used by individual laboratories in member states and to aid in establishing possible reference methods. Programs are also being conducted to standardize measurements of microbiological and chemical parameters in drinking water and to develop reliable methods for the determination of cyanides, phenols, and hydrocarbons in surface water. (See also W76-10637) (Kreager-FIRL)
W76-11613

VALIDATION OF ENVIRONMENTAL MEASUREMENT METHODOLOGY,
Environmental Monitoring and Support Lab., Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W76-11614

GROUNDWATER SUPPLIES OF THE COASTAL REGION,
For primary bibliographic entry see Field 5F.
W76-11618

MAN DISCOVERS THE COASTAL ENVIRONMENT: A FOOTPRINT IN THE SAND,
North Carolina State Univ. at Raleigh. University Studies.
For primary bibliographic entry see Field 5D.
W76-11621

FIRST THE WATER, THEN THE SEWER, THEN LAND USE PLANNING: COASTAL PLANNING IN RETROSPECT AND IN THE NOW,
North Carolina State Planning Div., Raleigh.
For primary bibliographic entry see Field 5D.
W76-11622

ECONOMIC IMPLICATIONS OF COASTAL WASTE DISPOSAL ALTERNATIVES,
Georgia Univ., Athens. Inst. of Natural Resources.
For primary bibliographic entry see Field 5E.
W76-11623

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

MARGINAL POLLUTION ANALYSIS FOR LONG RAGE FORECASTS,
Cornell Univ., Ithaca, N. Y. Center for Urban Development Research.
For primary bibliographic entry see Field 5G.
W76-11127

A MATRIX APPROACH FOR DETERMINING WASTEWATER MANAGEMENT IMPACTS,
Weston (Roy F.), New York.
For primary bibliographic entry see Field 5G.
W76-11128

POLITICAL RESOLUTION OF ENVIRONMENTAL CONFLICTS,
Waterloo Univ. (Ontario). Dept. of Systems Design.
For primary bibliographic entry see Field 6G.
W76-11129

INTERACTIONS BETWEEN LAND USE AND URBAN WATER RESOURCES PLANNING,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
For primary bibliographic entry see Field 4A.
W76-11130

OPTIMIZATION OF WATER DISTRIBUTION NETWORK SYSTEMS,
Weston (Roy F.), Inc., West Chester, Pa.
For primary bibliographic entry see Field 8B.
W76-11133

ESTIMATING FLOW CONDITIONS FOR RIVER MODELS,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 5B.
W76-11136

RESPONSE OF SOUTH PLATTE TO EFFLUENT LIMITATIONS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W76-11137

MULTI-CRITERION RANKING OF ALTERNATIVE LONG-RANGE WATER RESOURCE SYSTEMS,
National Water Authority, Budapest, Hungary. Dept. of Water Management Policy.
For primary bibliographic entry see Field 6B.
W76-11139

DYNAMIC MODELLING AND CONTROL APPLICATIONS IN WATER QUALITY MAINTENANCE,
Cambridge Univ. (England). Dept. of Engineering.
For primary bibliographic entry see Field 5G.
W76-11142

VILLAGE WATER SUPPLY, A WORLD BANK PAPER.
International Bank for Reconstruction and Development, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11143

A STOCHASTIC PROGRAMMING MODEL APPLIED TO WATER RESOURCES MANAGEMENT,
Computing Center for Universities, Budapest (Hungary).
For primary bibliographic entry see Field 4A.
W76-11144

MULTIPLE OBJECTIVE PLANNING FOR WATER RESOURCES, (VOL I),
Idaho Research Foundation, Inc. Moscow.
For primary bibliographic entry see Field 6B.
W76-11173

MULTIPLE OBJECTIVE PLANNING FOR WATER RESOURCES, (VOLUME II),
Idaho Research Foundation, Inc., Moscow.
For primary bibliographic entry see Field 6B.
W76-11174

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES. PHASE I. FINAL REPORT,
Purdue University, West Lafayette, Indiana, Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W76-11175

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: REGIONAL AQUIFER EVALUATION STUDIES WITH STOCHASTIC INPUTS,,
Purdue University, West Lafayette, Indiana, Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W76-11176

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: POPULATION CHARACTERISTICS AND RESIDENTIAL WATER USE,
Purdue Univ., Lafayette, Ind. Dept. of Sociology and Anthropology.
For primary bibliographic entry see Field 6B.
W76-11177

WATER QUALITY MANAGEMENT PLANNING FOR URBAN RUNOFF.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5D.
W76-11600

6B. Evaluation Process

COLLECTED REPRINTS, VOLUME III: 1971-1974,
Hawaii Univ., Honolulu. Water Resources Research Center.
Available from the National Technical Information Service, Springfield, Va., 22161, as PB-256 429, $11.75 in paper copy, $3.00 in microfiche. June 1975, 489 p. OWRT A-049-HI(1). 14-31-0001-5011.

Descriptors: Water resources, *Information retrieval, *Information exchange, *Hawaii, Conferences, Publications.

The objective of the Hawaii's Water Resources Information Dissemination project is to make more widely available reprints of professional articles, papers presented at scientific meetings, and reports of a limited circulation by WRRC staff and affiliate members. These studies, which are multidisciplinary in scope, identify, evaluate, assess, and measure the interacting factors that affect water resources in Hawaii. The publication of these specialized articles and papers makes available the results of a broad spectrum of research activity which, though specialized, is interrelated and provides an overall picture and understanding of the direction of current research in Hawaii. (See also W73-02347)
W76-11103

MARGINAL POLLUTION ANALYSIS FOR LONG RAGE FORECASTS,
Cornell Univ., Ithaca, N. Y. Center for Urban Development Research.
For primary bibliographic entry see Field 5G.
W76-11127

LOCAL ATTITUDES AND WATER RESOURCES DEVELOPMENT: A CANADIAN CASE STUDY,
Prince Edward Island, Charlottetown. Dept. of Sociology and Anthropology.
S. Dasgupta.
Water Resources Bulletin, Vol. 12, No. 1, p 27-37, February 1976. 5 tab, 10 ref.

Descriptors: *Water resources development, *Attitudes, River basins, Surveys, Education, *Canada, Social participation.
Identifiers: Public participation, Community residents, Status variables, *Dunk River basin(Canada), Level of living, Organizational participation.

The objective of this paper is to identify the variables which relate independently to attitudes toward water resources development and to determine whether or not these variables have a greater additive effect on attitudes when combined into an index than when considered singly. Six status vari-

ables, which have been found more or less consistently in previous studies to have relationship with attitudes, are related to attitudes toward Dunk River development. Four variables -- education, occupation, level of living, and organizational participation -- appear to have significant relationships with attitudes in this study. The relationships of length of residence in community and age with attitudes are not significant. The analysis of local attitudes is useful in identifying factors which affect the participation of community residents in water resources development activities, assuming that favorable attitudes are associated with increased participation. (Bell-Cornell)
W76-11132

FEM COUPLED WITH LP FOR WATER POLLUTION CONTROL,
Hiroshima Inst. of Tech., Itsukaichi (Japan).
For primary bibliographic entry see Field 5B.
W76-11134

MULTI-CRITERION RANKING OF ALTERNATIVE LONG-RANGE WATER RESOURCE SYSTEMS,
National Water Authority, Budapest, Hungary. Dept. of Water Management Policy.
L. David, and L. Duckstein.
Water Resources Bulletin, Vol. 12, No. 4, p 731-754, August 1976. 6 fig, 5 tab, 28 ref.

Descriptors: *Water resources, *Systems analysis, *Long-range planning, *Alternative planning, Economics, Water utilization, Methodology, Probability, Consumptive use, Non-consumptive use, Water quality, Evaluation.
Identifiers: *Cost-effectiveness, *Tisza River basin(Hungary), Energy requirements, Sensitivity analysis, System performance.

The definition and comparison of alternative water resource systems designed to meet long-range goals (say 60 years) is illustrated by a case study of the Tisza River Basin in Hungary. A comprehensive cost-effectiveness approach is adapted to define goals, specifications, criteria, and alternatives and their capabilities. Specifications include demands given in probabilistic terms. The comparison of alternative systems is based on 12 criteria, one of which is the balance between total energy consumed and peak energy produced. Important factors involving social elements, such as flood protection and land and forest use, are described both as monetary quantities and as qualitative appreciations. Five alternative systems are defined involving flat land reservoirs, pumped storage reservoirs, interbasin transfer, and conjunctive use of surface and ground water. International cooperation is then used to rank systems and reduce the problem to a tradeoff between only two alternatives. (Bell-Cornell)
W76-11139

COST BENEFIT ANALYSIS AND WATER POLLUTION POLICY.
Urban Inst., Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-11153

THE CONCEPT OF BENEFITS IN COST-BENEFIT ANALYSIS: WITH EMPHASIS ON WATER POLLUTION CONTROL ACTIVITIES,
Wisconsin Univ., Madison. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W76-11154

A SURVEY OF THE TECHNIQUES FOR MEASURING THE BENEFITS OF WATER QUALITY IMPROVEMENT,
Bowdoin Coll. Brunswick, Maine. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W76-11155

SOME INSTITUTIONAL AND CONCEPTUAL THOUGHTS ON THE MEASUREMENT OF INDIRECT AND INTANGIBLE BENEFITS AND COSTS,
Wisconsin Univ., Madison. Dept. of Economics.
J. Bishop, and C. Cicchetti.
In: Cost Benefit Analysis and Water Pollution Policy, Environmental Protection Agency and Urban Institute Symposium, September 5-7, 1973, Annapolis, Md. Published in 1975, p. 105-126. 15 ref.

Descriptors: *Water pollution control, *Cost-benefit analysis, *Project benefits, *Measurement, *Intangible benefits, *Intangible costs, Econometrics, Aesthetics, Evaluation, Social values, Mortality, Psychological aspects, Morbidity.
Identifiers: Option value, Hedonic pricing.

The concepts as to how to include intangible and environmental non-user benefits (such as the valuation of postponing death, indirect benefits of postponing death, the valuation of good health), and the application of the hedonic method to measurement of the private valuation of risk are propounded. It is suggested that the characteristic approach to utility theory be used to give a systematic theoretical basis to methods for using observable market prices to place values on nonmarketed outputs. By viewing the consumer's utility function as defined over a limited number of attributes or consumption activities rather than over an infinite list of unique products, commonalities can be defined between things that are sold in markets and the free or public goods that are not. The trade-offs between money and a characteristic that people exhibit in their private behavior can be used to estimate the implicit price of attributes provided by public projects. The attributes that often appear as intangibles in cost-benefit analysis--risk of early death, pain, loss of personal beauty, option value, congestion, disruption in the use of nonwork time--are discussed and methods for evaluating them monetarily are suggested and evaluated. As intangible benefits are not distributed over project design or program clientele proportionately to the more easily measured benefits, their elimination inevitably distorts the planning process. (See also W76-11153) (Auen-Wisconsin)
W76-11156

A SURVEY OF EMPIRICAL BENEFIT STUDIES,
Environmental Protection Agency, Washington, D.C.
D. Tihansky.
In: Environmental Protection Agency and Urban Institute Symposium, September 5-7, 1973, Annapolis, Md. Published in 1975, p. 127-172. 1 fig., 3 tab., 113 ref.

Descriptors: *Intangible benefits, *Cost-benefit analysis, *Water pollution control, *Methodology, *Estimating, Econometrics, Evaluation, Pricing, Reviews, Water quality standards, Water utilization.

Selected studies contributing most to the conceptual framework and empirical insights of benefit evaluation are reviewed, with less than 30% found theoretically valid; even fewer seem cognizant of the applicability, let alone the existence of welfare economics. The state of the art on benefit studies is outlined and the empirical findings contrasted. The criteria for judging the adequacy or relevance of benefit assessment are prescribed, the literature evaluated according to these criteria, and the utility of translating all benefits into precise monetary values analyzed. An Appendix examines selected references for methodological weaknesses and reviews empirical estimates with emphasis on their adaptability to local and regional planning. Extensive comments on the references are contained in the Appendix, where the studies are partioned according to their focus on a specific pollutant, a particular water use, or a more comprehensive analysis. The Appendix concentrates on the misapplication or misinterpretation of theoretical and empirical notions, i.e., having chosen a methodology for benefit estimation, the empiricist next faces problems of gathering relevant data, formulating reliable damage relations from this data, and then interpreting them in a proper economic perspective. A multidisciplinary framework of analysis, as implemented successfully in regional planning, is recommended as the most viable alternative to benefit analysis. (See also W76-11153) (Auen-Wisconsin)
W76-11157

COSTS OF WATER QUALITY IMPROVEMENT, TRANSFER FUNCTIONS, AND PUBLIC POLICY,
Resources for the Future, Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-11158

VALUING LONG-RUN ECOLOGICAL CONSEQUENCES AND IRREVERSIBILITIES,
Maryland Univ., College Park. Dept. of Economics.
For primary bibliographic entry see Field 6G.
W76-11161

COST-BENEFIT ANALYSIS, PROPERTY RIGHT SPECIFICATION AND 'DISTRIBUTION',
Rand Corp., Santa Monica, Calif.
J. A. Stockfisch.
In: Cost Benefit Analysis and Water Pollution Policy, Environmental Protection Agency and Urban Institute Symposium, September 5-7, 1973, Annapolis, Md. Published in 1975, p. 313-331. 12 ref.

Descriptors: *Cost-benefit analysis, *Resource allocation, *Legal aspects, *Pollution abatement, Decision making, Theoretical analysis, Political aspects, Law enforcement, Social value, Motivation, Welfare(Economics).
Identifiers: *Property rights, Common property, Externalities, Incentive.

The concept of 'property rights'--that 'it is a scheme of relationships between individuals with respect to an object' and the idea of 'exclusion' precede the discussion of the property rights approach in cost-benefit analysis. The structure of property rights both constrains and motivates people with respect to the use of scarce commodities and services; thus it impacts on the utilities provided by various outputs and hence on relative demands and resource allocation. Changes in law and the content of property rights cannot help but affect the distribution of resource earnings, wealth, and welfare, hence both relative prices and costs observed in the economy are functions of the legal and political systems. Environmental quality improvements can generally be implemented in the public realm by either constraining people's behavior by law; or by undertaking public resource-using projects or activities. Changes in the law and outputs of government projects affect income distribution and the relative prices of resources and other inputs--and through this nexus can change government program costs--the impact on costs will be in the future. This aspect of general interdependence, however, would not be used to reject existing prices as appropriate measures of program or project costs. (See also W76-11153) (Auen-Wisconsin)
W76-11162

PROJECT-BY-PROJECT ANALYSIS VS. COMPREHENSIVE PLANNING,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-11163

COST-BENEFIT ANALYSES OF COST-BENEFIT ANALYSIS,
California Univ., Riverside. Dept. of Economics.
T. D. Crocker.
In: Cost Benefit Analysis and Water Pollution Policy, Environmental Protection Agency and Urban Institute Symposium, September 5-7, 1973, Annapolis, Md. Published in 1975, p. 341-359. 9 ref.

Descriptors: *Data collections, *Cost-benefit analysis, *Decision making, *Pollution abatement, Specifications, Measurement, Correlation analysis, Heterogeneity, Methodology.

A general model is used as a framework for decisions about information and is designed to be applicable to a wide variety of informational systems and real world circumstances including cost-benefit analysis of water pollution activities. The model is viewed as a vehicle for tools rather than as an instrument capable of direct empirical application. Minimally, itcan make those who must decide about information structures aware of the nature of the relations among relevantvariables, including those variables that are important for normative purposes. The model is helpful in identifying the general elements of the information evaluation decision problems, but unless greater specificity is introduced, it is incapable of indicating whether an information assessor should regard a structure as good or bad. Qualitative criteria is provided for this decision problem and some factors pointed out that might influence the relative costs and benefits of alternative information structures. Considered are the factors that influence the costs and benefits of cost-benefit analysis for the decision maker when information assessors and decision makers have incompatible perceptions of the utility of different acts and probabilities of various results, and the problem of evaluating alternative ways of motivating the assessor to maximize the decision maker's own effectiveness, and how to make prior and retrospective evaluations of the assessor's performance. (See also W76-11153) (Auen-Wisconsin)
W76-11164

THE ROLE OF COST-BENEFIT ANALYSIS IN POLICY MAKING,
Stanford Univ., Calif.
H. Rowen.
In: Cost Benefit Analysis and Water Pollution Policy, Environmental Protection Agency and Urban Institute Symposium, September 5-7, 1973, Annapolis, Md. Published in 1975, p. 361-370. 3 ref.

Descriptors: *Cost-benefit analysis, *Decision making, Methodology, Social aspects, Federal project policy, Water quality standards.
Identifiers: *Policy making, *Policy evaluation.

While the predominant concept of cost-benefit analysis is as a method for making choices, i.e., a decision rule which enables selection of the most efficient of several alternative courses of action, the other role of cost-benefit analysis as a contribution to the decision processes by assisting in the formulation of objective and of alternative actions as well as contributing to the process of choice between them is discussed. Cost-benefit analysis in the decision process is based on the premise that objectives and alternatives must be discovered, designed, and invented. In this definition, cost-benefit analysis can provide a conceptual structure and a set of techniques for relating means to ends, for arraying the various costs associated with each course of action, and for describing, comparing, and assessing possible outcomes. It may be able to express something about the values people attach to various outputs. It can be used to test the sensitivity of alternatives to different contingencies. A competent cost-benefit analysis is very useful in constructing and assembling values, facts, and relationships. The concept of input (cost) and output (benefit) provides an extremely useful framework for organizing pertinent facts and relationships in dealing with policy problems. It can reveal social cost, equipable compensation, and resolve the problem in specifying the relationship between inputs of resources and outputs (production functions). (See also W76-11153) (Auen-Wisconsin)
W76-11165

VOTING, COST-BENEFIT ANALYSIS, AND WATER POLLUTION POLICY,
Resources for the Future, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11166

THE REDISTRIBUTIONAL CONSEQUENCES OF PUBLIC RECREATION PROVISION AT THE POTHOLES RESERVOIR--COLUMBIA BASIN PROJECT, WASHINGTON,
Washington State Univ., Pullman. Dept. of Agricultural Economics.
K. C. Scott, and C. D. Ditwiler.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 577, $5.50 in paper copy, $3.00 in microfiche. Washington Water Research Center, Pullman, Report No. 25, May 1976. 101 p, 3 fig, 41 tab. 58 ref, 3 append. OWRT A-066-WASH (2). 14-31-0001-5048.

Descriptors: *Recreation, *Washington, Reservoirs, *Benefits, *Estimated costs, Human population, Cost analysis, *Recreation demand, Distribution patterns, Social aspects, Economics.
Identifiers: Public costs, *Potholes Reservoir(Wash), *Columbia Basin Project(Wash).

The purpose was to identify the redistributional consequences of the public recreation provision at the Potholes Reservoir. The Potholes Reservoir serves as a small storage reservoir within the Bureau of Reclamation's Columbia Basin Project. Although the reservoir was originally constructed for irrigation purposes, it receives extensive recreational use by recreationists from all parts of the state of Washington. State and local governments have provided a majority of the funds for the recreational facilities at the reservoir as well as usual operation and maintenance costs. Benefits were assigned to relevant socio-economic classifications of recreationists based on the results of a recreation survey wherein 2,650 recreational parties were interviewed. Estimates of the public costs of providing and maintaining outdoor recreation opportunity at the reservoir were obtained from federal and state agencies administering public recreation in the area. The final incidence of these public costs were assigned to income classes, and subsequently to geographical areas and age groups according to the estimated tax incidence effect of the public sector in the state. The recreationists receiving positive redistributional impacts were the lower classes ($0-7,500 annual income), the young (under 25 years of age), the elderly (over 55 years of age), and the recreationists residing in the geographical areas adjacent to the reservoir area.
W76-11168

MULTIPLE OBJECTIVE PLANNING FOR WATER RESOURCES, (VOL I),
Idaho Research Foundation, Inc. Moscow.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-256 739, $4.50 in paper copy, $3.00 in microfiche. Proceedings of the UCOWR Workshop on Multiple Objective Planning and Decision-making, Las Vegas, Nevada, July 16-18, 1974. Natural Resources Series No. 5, 1974. 63 p, 17 ref. E. L. Michalson, A. E. Englebert, Wade Andrews (eds.). OWRT X-142(No. 4259)(1).

Descriptors: Water resources, Planning, *Alternative planning, *Comprehensive planning, *Decision making, Economic efficiecy, Methodology, Programs, River basin development, *Multiple-purpose projects, Water resources development, *Conferences, Information exchange.
Identifiers: *Multiple Objective Planning.

The workshop originated as an effort on the part of the Committee for Education and Research in the Social Sciences of the Universities Council on Water Resources. During the 1972 UCOWR annual meeting a task force was established to identify research topics and problems related to multiple objective planning and decision making; during the 1973 UCOWR meeting it was decided to have the workshop. The workshop itself was designed to provide a means of exchange between federal agency planners and university researchers. Agency planners -- through position papers -- provided basic input to use in multiple objective planning. (See also W76-11174)
W76-11173

MULTIPLE OBJECTIVE PLANNING FOR WATER RESOURCES, (VOLUME II),
Idaho Research Foundation, Inc., Moscow.
Proceedings of the UCOWR Conference on Multiple Objective Planning and Decision Making, Boise Idaho January 14-16, 1975 Natural Resources Series No. 5, 1975. 122 p, 153 ref, C. R. Stratton E. L. Michalson, A. E. Engelbert, Wade Andrews (eds.) tech ed. OWRT X-142(No. 4259)(2).

Descriptors: Water resources, Planning, *Decision making, Social Impact, Environmental effects, Methodology, *Alternative planning, *Conferences, Cost-benefit analysis, *Comprehensive planning, Information exchange.
Identifiers: *Multiple Objectives Planning.

The conference discussed was a result of efforts by the Committee for Education Research in the Social Sciences of the Universities Council on Water Resources. During the 1972 UCOWR annual meeting, a task group was established to identify research topics and problems related to multiple objective planning and decision making. At the 1973 UCOWR annual meeting, a resolution was passed calling for a national Workshop-Conference on the topic. The Conference was designed to allow the university people to present their ideas for public discussion by federal agency planners. The Workshop papers were presented in Volume 1, the present volume contains the Conference papers, together with summaries of the discussion and panels. (See also W76-11173)
W76-11174

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES. PHASE I. FINAL REPORT,
Purdue University, West Lafayette, Indiana. Water Resources Research Center.
J. W. Delleur, J. M. Bell, L. Z. Breen, W. N. Melhorn, and W. L. Miller.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-256 565, $5.00 in paper copy, $3.00 in microfiche. Technical Report No. 74, April 1976, 71 p, 17 fig, 18 tab. OWRT C-3277(No 3713) (12).

Descriptors: *City planning, *Urban drainage, *Social aspects, *Economics, *Land use, *Urban hydrology, *Ground water, Drainage systems, Urban runoff, Urbanization, Storm drains, Groundwater movement, Water pollution, Population, Distribution patterns, *Indiana, Oklahoma, Illinois.
Identifiers: *Demographic studies.

The interdisciplinary study for planning urban water resources development gives models for estimating population growth, water demand, quantity and quality of surface runoff, and availability of ground water for communities in the 100,000 to 200,000 population range. These models were extended for a 25 to 30 year period. The test area was principally the Lafayette and West Lafayette, Indiana area. Additional sites in Indi-

ana, Oklahoma, and Illinois were used for specific purposes. Life tables were developed for the area and a regression equation proposed which relates water consumption to size and value of houses, rental values and population age distribution. A procedure for developing aquifer maps is presented as well as a ground water model which responded to different pumping stresses. Deterministic and stochastic models of the lumped nonlinear type are presented which portray the rainfall-runoff process and appropriately quantify the effects of urbanization on runoff. For the water quality model, suspended solids and BOD are utilized, and if possible to obtain, total and fecal coliform counts, total solids, COD, and phosphorus data. Alternative methods of surface drainage were considered and comparisons made of the benefit-cost relationship of providing the various drainage systems before urbanization has begun and after it is completed. (See W76-11176 and W76-11177)
W76-11175

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: REGIONAL AQUIFER EVALUATION STUDIES WITH STOCHASTIC INPUTS,
Purdue University, West Lafayette, Indiana, Water Resources Research Center.
Bathala, T. Chenchayya, J. A. Spooner, Rao, and A. Ramachandra.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 564, $5.00 in paper copy, $3.00 in microfiche. Technical Report No. 72, February 1976. 83 p, 40 fig, 17 tab, 52 ref, append. OWRT C-3277(No. 7313)(11).

Descriptors: *Aquifer systems, *Glacial aquifers, *Groundwater recharge, *Mathematical models, Water resources, Planning, Groundwater, Aquifers, Recharge, Base flow, Hydraulic conductivity, Infiltration, Aquifer characteristics, Aquifer management, Aquitards, *Indiana, City planning, Regional analysis.
Identifiers: *Lafayette(Ind).

A deterministic digital model is developed representing glacial aquifers to assist water resource planners of medium size urban communities. The glacial aquifer selected as the test site was that underlying the Greater Lafayette, Indiana Area. The digital model was formulated by using the finite difference method. Initial estimates of recharge from ponds and base flow into streams were obtained from a flow net analysis. Cross correlations and time lags between rainfall, river stages and groundwater levels were examined to introduce net recharge due to rainfall into the model and to establish the hydraulic interaction between the rivers and the aquifer. The digital model was calibrated by using a parameter adjustment procedure. The values of hydraulic conductivity, storage coefficient, net recharge due to rainfall and base flow into the stream were suitably adjusted to simulate the observed historic water levels. Stochastic difference equation models were fitted into the historic input time series of rainfall and river stages and these models were used to provide inputs to estimate the aquifer capacity under increased water demand. Results showed that the cross correlation studies were useful in introducing recharge due to rainfall and in examining the hydraulic connection between the rivers and the aquifer. The vertical leakage from the overlying aquitards and the induced streambed infiltration were included in the digital model as lumped quantities without considering the physical properties of the overlying aquitards and the streambed. (See also W76-11175)
W76-11176

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: POPULATION CHARACTERISTICS AND RESIDENTIAL WATER USE,
Purdue Univ., Lafayette, Ind. Dept. of Sociology and Anthropology.
H. R. Potter, E. R. Cooper, and L. Z. Breen.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 566, $4.00 in paper copy, $3.00 in microfiche. Purdue University Water Resources Research Center, Technical Report No. 63, May 1976. 35 p, 5 fig, 15 tab, 88 ref. OWRT C-3277(No. 7313) (13).

Descriptors: *Community development, *Growth rates, Human population, Social aspects, Urban sociology, City planning, Water utilization, *City planning, *Indiana, Regression analysis.
Identifiers: *Demographic studies, Urban Water Resources Development, Medium size communities, *Lafayette(Ind).

Household technology has increased the use of residential water. In this study involving the Lafayette-West Lafayette, Indiana Area, there were substantial differences in the quantity of water used by different residences and these differences were shown to be related to socioeconomic and demographic characteristics. These relationships, in combination with population projections, can be used for predicting future water demand. The use of tracts and blocks were compared in the study. Tracts were the larger area units containing 4000 or more persons. Because of the larger number of blocks, there was an advantage in their use in examining relationships. In the analyses high income tracts had per capita water consumption rates about 3 times that of the low income. Positive relationships were found between water use and housing value, median number of rooms, percent of families in single dwellings, percent of high school graduates and percent of white collar workers. Percent in families below the poverty level was negatively related. Multiple regression analysis of the block data generally supported the interpretation of the tract data. Age of residents did not show a consistent pattern. Significant interactions were found for age with owned housing values and home size. (See also W76-11175) (Wierswa-Purdue)
W76-11177

SOME ISSUES REGARDING REGULATORY POLICY, POLITICAL PARTICIPATION, AND SOCIAL IMPLICATIONS OF GEOTHERMAL RESOURCE DEVELOPMENT IN THE IMPERIAL VALLEY,
Center for Social and Behavioral Science Research. University, Riverside, California.
For primary bibliographic entry see Field 6E.
W76-11328

EFFECTS OF WATER QUALITY ON THE RECREATIONAL USE OF WATER IN SOUTH EAST TEXAS,
Lamar Univ., Beaumont, Tex. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 5G.
W76-11335

AN EVALUATION OF PUBLIC HEARINGS ON WATER DEVELOPMENT PROJECTS IN MISSISSIPPI,
Mississippi State Univ., Mississippi State. Social Science Research Center.
G. D. Hampe.
Available from the National Technical Information Service Springfield, Va 22161, as PB-256 583, $5.00 in paper copy, $3.00 in microfiche. Mississippi Water Resource Research Institute, Mississippi State, Completion Report, July 1976. 74 p, 34 tab, 12 ref, 2 append. OWRT A-091-MISS(1).

Descriptors: *Social participation, Mississippi, Evaluation, Projects, Water resources development, Public rights, Social aspects, Social values, Social change.
Identifiers: *Public participation.

Research findings from three modes of investigation relating to public participation in public meetings held by the Corps of Engineers during the period 1962-1975 showed similar results. Most participants supported the projects proposed by the Corps. Participants were on the average of a higher social class than the general population. The main conclusion to be drawn from this research was that the Corps has responded to its public in the past and continues to do so at present. Younger participants in the public hearing process are beginning to bring into focus more opposition than has existed in the past. The public to which the Corps has responded and continues to respond consists of the leading members of the business and political communities.
W76-11337

ESTABLISHING INSTREAM FLOWS: ANALYSIS OF THE POLICY-MAKING PROCESS IN THE PACIFIC NORTHWEST,
Washington State Univ., Pullman. Dept. of Political Science.
P. L. Beckett, and B. L. Lamb.
Available from the National Technical Information Service Springfield, Va 22161, as PB-256 575, $5.00 in paper copy, $3.00 in microfiche. Completion Report, (1976). 76 p, 18 tab. OWRT A-077-WASH(3), 14-34-0001-6050.

Descriptors: Water utilization, Water allocation(Policy), Flow, Low flow, *Decision-making, Legal aspects, *Pacific Northwest U. S., *Water policy, *Competing uses.
Identifiers: *Instream flow, Minimum flow.

An analysis was conducted of the decision-making process in natural resources management, accomplished through investigation of the establishment of instream flows in the Pacific Northwest. Instream uses of water are those which use the water while it remains in the stream. These uses require water flow for fish and wildlife habitat, navigation, hydro-electric power production, recreation, aesthetics and waste dilution. A wide variety of agencies of both the federal and state governments is involved in determining policy regarding the amount of water to be left in streams. Practitioners in the field of natural resource management and some members of the general public are frustrated because the decision-making process does not conform to notions about rationality and comprehensiveness in policy-making. Policy-making in the American political culture has traditionally reflected the interplay of a variety of interests, often in conflictual situations. However, decision-making is more than conflict and bargaining among agencies. Four hypotheses are suggested and discussed. First, it is suggested that at the system level decision-making is characterized by bargaining. Second, it is suggested that at the group level decisions are made by muddling through, or incremental reliance on previous policy stands. Third, it is suggested that at the group level policy is made in part through organizational process. That is, agencies rely on a repertoire of procedures to collect and process information; they follow routine. Fourth, it is suggested that at the individual level agency representatives tend to align themselves with others in the same profession, thus mitigating conflicts between agencies. Data collected from a survey questionnaire, content analysis, and personal interviews are used in this analysis.
W76-11339

TEXAS COASTAL MANAGEMENT PROGRAM. HEARING DRAFT. EXECUTIVE SUMMARY.
Texas General Land Office, Austin.
June 1976, 55 p.

Descriptors: *Texas, *Continental shelf, *Coasts, *Land use, *Resources development, *Management water resources, Economics, Oil industry, Biota, Aquatic life.
Identifiers: *Outer Continental Shelf, Coastal zone management.

The objectives of the Texas Coastal Management Program are, through interagency cooperation and extensive public participation, to develop and recommend to the governor and legislature: an improved and flexible policymaking process which will ensure a continuing balance among future economic, environmental and social needs along the coast; and the steps for implementing such a process. This document summarizes the draft recommendations developed to date by this program, and it is intended to inform the public of those recommendations prior to public hearings. (See also W76-11466 and W76-11467) (Sinha - OEIS)
W76-11465

TEXAS COASTAL MANAGEMENT PROGRAM. HEARING DRAFT.
Texas General Land Office, Austin.
June 1976. 114 p, 23 ref, 5 plates.

Descriptors: *Texas, *Continental shelf, *Oil industry, *Resources development, Water resources, *Aquatic life, Estuaries, Bays, Marshes, Vegetation, Management, Coasts, Maps.
Identifiers: *Outer Continental Shelf, Gas industry, Coastal Zone Management.

The Texas Coastal Management Program was initiated in June of 1974 as a joint project by the state's natural resource agencies to devise a flexible policy-planning process. After an extensive survey of existing resource data and current governmental authority for coastal management, a comprehensive inventory of Texas coastal resources, a study of current and projected economic activity, and an intensive public participation program, the Coastal Management Program has developed recommendations for a process to resolve future conflicts in resource use. This volume presents: the bases for the state's concern regarding Texas coastal waters and adjacent shorelands; the various local, regional, state, and federal authorities now managing coastal resources; documentation of coastal problems judged to be both important and proper objects of state concern; the program's conclusions and recommendations for improving the present management process; and a review of the advantages and disadvantages associated with these proposed changes. (See also W76-11465) (Sinha - OEIS)
W76-11466

TEXAS COASTAL MANAGEMENT PROGRAM. HEARING DRAFT. APPENDICES.
Texas General Land Office, Austin.
June 1976. 161 p, 40 fig.

Descriptors: *Texas, *Continental shelf, Resources, Water resources, Ecology, *Management, *Land use, *Aquatic life, *Biota, *Grasses, Coasts, Shores, Marshes, Estuaries, Hazards, Recreation, Energy.
Identifiers: *Outer Continental Shelf, Coastal Zone Management, Seagrass.

The volume contains 7 appendices to the final report of the Texas Coastal Management Program. The information presented was used in the formulation of the recommendations of the Program. Appendix 1 is a generalized description of the composite resource areas of coastal waters and shorelands. Appendix 2 presents a method for describing the functioning of an ecological system through the use of an ecological systems diagram. Appendix 3 details analytical routine which may be used for assessing the effects of activities in coastal waters or shorlands. Appendix 4 is concerned with the implementation of an activity-assessment routine. Included is a detailed examination of the way this procedure could be used in the permitting and review processes. Appendix 5 describes the present authorities of state and federal agencies which are involved in coastal management. Appendix 6 defines the national interest in the coastal region of Texas. It contains a definition of lands excluded from the management area, recommended state-federal coordination mechanisms, and summaries of federal agency statements of national interest. Appendix 7 reviews the proposed coastal management process. It demonstrates how this process solves the problems of policy gaps and conflicts while offering a comprehensive coastal management plan. Included is a summary of present substantive resource policies and recommended additions. (See also W76-11465) (Sinha - OEIS)
W76-11467

REVIEW OF OFFSHORE EXPLORATION IN FLORIDA,
University of South Florida, Tampa. Dept. of Geography.
For primary bibliographic entry see Field 6G.
W76-11470

PROCEEDINGS TENTH BIENNIAL CONFERENCE ON GROUND WATER, TOTAL WATER MANAGEMENT FOR CALIFORNIA'S LONG-RANGE NEEDS.
California State Dept. of Water Resources, Scramento.
For primary bibliographic entry see Field 4B.
W76-11491

MANAGEMENT OF WATER RESOURCES UNDER DIFFERENT SOCIO-ECONOMIC CONDITIONS,
Arizona University, Tucson, Committee on Arid Lands Resources.
S. M. H. Bokhari.
Ph.D. Dissertation, 1975. 289 p, 24 tab, 130 ref.

Descriptors: *Arid lands, *Water resources development, *Water management(Applied), *Constraints, Cost-benefit analysis, Decision making, Social aspects, Economics, Management, Project planning, Project post-evaluation, Irrigation, *Arizona, *Crop production.
Identifiers: Wellton-Mohawk Irrigation District(Ariz), Salinity Control and Reclamation Project(Pakistan), *Pakistan.

A review is presented of current strategies, objectives, methodologies and practices in the field of water resources development and management, with particular attention to constraints under different socio-economic conditions. The applicability of a 'cost-effectiveness' approach to hindsight evaluation of water projects is discussed. That approach can be used for 'ex-ante' and 'ex-post' evaluation, comparative evaluation of more than one objective, and for tangible and intangible measures of effectiveness. Water management under different socio-economic conditions has been analyzed by comparing the performances of the Wellton-Mohawk Irrigation District in Arizona with the Salinity Control and Reclamation Project No. 1 in Pakistan. The American system is flexible enough to accomodate any technological innovation and can supply the full water requirement for any cropping pattern, while the Pakistan system has an inelastic 7-day fixed roster for water supply which is inadequate for even 50% of the presently irrigated area. Recommendations are made for removing management constraints in Pakistan and other developing countries. (Jahns-Arizona)
W76-11514

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ENERGY REDUCTION THROUGH IMPROVED IRRIGATION PRACTICES,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W76-11109

LAND PRICES IN FLOOD HAZARD AREAS: APPLYING METHODS OF LAND VALUE ANALYSIS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6F.
W76-11112

COST SHARING TO INDUCE EFFICIENT TECHNIQUES OF ABATING WASTEWATER POLLUTION,
National Bureau of Standards, Washington, D.C., Building Economics Section.
For primary bibliographic entry see Field 5G.
W76-11135

THE ECONOMICS OF FISHING AND MODERN CAPITAL THEORY: A SIMPLIFIED APPROACH,
British Columbia Univ., Vancouver. Dept. of Economics; and British Columbia Univ., Vancouver. Dept. of Mathematics.
C. W. Clark, and G. R. Munro.
Journal of Environmental Economics and Management, Vol. 2, No. 2, p 92-106, December 1975. 3 fig, 39 ref.

Descriptors: *Fishing, *Fisheries, *Economics, *Capital, Costs, Benefits, Investment, Linear programming, Dynamic programming, Management, Water resources, Control, Systems analysis, Mathematical models, Equations.
Identifiers: Benefit maximization, Nonautonomous models, Nonlinear programming, Capital theory.

While the link between fisheries economics and capital theory has long been recognized, fisheries economics has, until the last few years, developed largely along nondynamic lines. The purpose of this article is to demonstrate that, with the aid of optimal control theory, fisheries economics can without difficulty be cast in a capital-theoretic framework yielding results that are both general and readily comprehensible. Developed is a dynamic linear autonomous model. The static version of the fisheries economics model is seen to be the equivalent of a special case of the dynamic autonomous model. The model is then extended, first by making it nonautonomous and second, nonlinear. Problems arising therefrom, such as multiple equilibria, are considered. (Bell-Cornell)
W76-11140

ESTIMATED COSTS OF MECHANICAL CONTROL OF WATER HYACINTHS,
Georgia Univ., Athens. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5G.
W76-11141

COST BENEFIT ANALYSIS AND WATER POLLUTION POLICY.
Urban Inst., Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-11153

COSTS OF WATER QUALITY IMPROVEMENT, TRANSFER FUNCTIONS, AND PUBLIC POLICY,
Resources for the Future, Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-11158

ENVIRONMENTAL POLICY COSTS: DEFINITION, MEASUREMENT, AND CONJECTURE,
California Univ., Riverside.
For primary bibliographic entry see Field 5G.
W76-11159

ESTIMATES OF INDUSTRIAL WATERBORNE RESIDUALS CONTROL COSTS: A REVIEW OF CONCEPTS, METHODOLOGY, AND EMPIRICAL RESULTS,
Johns Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 5G.
W76-11160

COST OPTIMIZATION OF RURAL WATER SYSTEMS,
Iowa State Univ., Ames. Dept. of Civil Engineering.
R. B. Robinson, and T. A. Austin.
Journal of the Hydraulics Division, Proceedings of the American Society of Civil Engineers, Vol. 102, No. HY8, Proceedings paper No. 12301, p 1119-1134, August 1976. 7 fig, 4 tab, 6 ref. OWRT A-048-IA(2)

Descriptors: *Water distribution(Applied), *Water supply, *Regional analysis, *Costs, Linear programming, Design, Hydraulics, Mathematical models, Optimization, Engineering, Systems analysis, Pipes.
Identifiers: *Cost minimization.

A rural water system is a water supply and distribution system that is built for low density predominately unincorporated rural areas. It primarily serves domestic and livestock needs and does not necessarily supply fire fighting requirements. The pipe distribution network has the unique feature of being an unlooped or dead-end system in most cases. This paper describes a method for achieving the least cost or 'optimal design' for certain portions of rural water distribution system. Optimization is achieved by methods that combine linear programming and engineering judgment. The variables that can be considered by this programming approach are: (1) pipe diameter; (2) pipe pressure rating; (3) pressure reducing valve setting and location; and (4) pumping head or water tower height. The method has been demonstrated on a simple hypothetical distribution system with good results. (Bell-Cornell)
W76-11167

THE REDISTRIBUTIONAL CONSEQUENCES OF PUBLIC RECREATION PROVISION AT THE POTHOLES RESERVOIR--COLUMBIA BASIN PROJECT, WASHINGTON,
Washington State Univ., Pullman. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W76-11168

MAINTENANCE MANAGEMENT OF WATERWORKS SYSTEM,
Thorne Riddell Associates Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 5F.
W76-11254

GRANULAR MEDIA FILTRATION: A POSITIVE COST EFFECTIVE METHOD TO PREPARE WASTEWATERS FOR REUSE BY REMOVAL OF SUSPENDED SOLIDS,
Ecodyne Corp., Union, N. J. Industrial Waste Treatment Div.
For primary bibliographic entry see Field 5D.
W76-11262

WASTEWATER RECYCLE - THE PROPER APPROACH TO EVALUATION OF DISPOSAL VERSUS REUSE,
Ecodyne Corp., Union, N. J. Industrial Waste Treatment Div.
For primary bibliographic entry see Field 5D.
W76-11263

A QUADRATIC PROGRAMMING APPROACH TO THE PRODUCTION OF CALIFORNIA FIELD AND VEGETABLE CROPS EMPHASIZING LAND, WATER AND ENERGY USE,
California Univ., Davis. Dept. of Agriculture Economics.
For primary bibliographic entry see Field 3F.
W76-11326

THE IMPACT OF FLOODING UPON LAND VALUES IN THE BIG BLACK RIVER BASIN,
Mississippi Univ., University. Dept. of Economics.
W. E. Boyet, K. W. Hollman, and L. Sterling.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 578, $4.00 in paper copy, $3.00 in microfiche. Mississippi Water Resources Research Institute, Mississippi State, Completion Report, July 1976. 38 p, 3 fig, 7 tab, 21 ref. OWRT A-093-MISS(1).

Descriptors: Floods, *Flood damage, *Property values, Prices, *Pricing, Land appraisals, *Mississippi, Land use, Regression analysis, Model studies, Costs, Economics.
Identifiers: *Big Bear River basin(Miss).

The purpose was to determine the impact of flooding upon the value of land in the Big Black River basin. Economic rent theory was extended and modified to explain how flooding influences land values. Two theoretical components of the overall effect of flooding were identified. First, it tends to cause shifts in land use to end eavors which yield lower returns. Second, it tends to increase production costs. The combined effect is to reduce realized earnings, thereby reducing land values. In order to obtain empirical estimates of these effects, sales price and other characteristics were ascertained for two independent samples of transfers, one which was flood-prone and one which was flood-free. Regression analysis was used to develop a model to explain variation in transfer prices for each of the two samples. Different variables were important in explaining price variation and there were significant differences in the coefficients of some variables between the two regressions. Additional regression analysis conducted on the flood-prone sample suggested that flooding which causes crop damage results in a reduction in value of $28 per acre or approximately 13 percent.
W76-11330

WICHITA FALLS INTEGRATED MUNICIPAL INFORMATION SYSTEM, WATER UTILITY PROCESSING SYSTEM (WUPS), APPLICATION COMPLETION REPORT, VOLUME I.
For primary bibliographic entry see Field 3D.
W76-11596

WICHITA FALLS INTEGRATED MUNICIPAL INFORMATION SYSTEM, WATER UTILITY PROCESSING SYSTEM (WUPS), APPLICATION COMPLETION REPORT, VOLUME II.
For primary bibliographic entry see Field 3D.
W76-11597

MANAGEMENT AND FINANCING ALTERNATIVES FOR WASTE DISPOSAL IN COASTAL AREAS,
North Carolina Univ. at Chapel Hill. Inst. of Government.
For primary bibliographic entry see Field 5E.
W76-11616

ECONOMIC IMPLICATIONS OF COASTAL WASTE DISPOSAL ALTERNATIVES,
Georgia Univ., Athens. Inst. of Natural Resources.
For primary bibliographic entry see Field 5E.
W76-11623

6D. Water Demand

UNDERGROUND STORAGE OF STATE WATER PROJECT SUPPLY, A PROGRESS REPORT,
Los Angeles City Dept. of Water and Power. Aqueduct Div.
For primary bibliographic entry see Field 4B.
W76-11119

6E. Water Law and Institutions

BELGIUM (LEGISLATION ON UNDERGROUND WATERS).
Food and Agriculture Organization of the United Nations, Rome (Italy).
In: Water Law in Selected European Countries, 1975. Vol 1, Chap IX, p 13-14, 6 ref.

Descriptors: *Water law, *Foreign countries, *Water rights, Groundwater, Drilling, Administrative agencies, *Legislation, Water wells, Mining, Europe, Water pollution control, Quarries, Legal aspects.
Identifiers: *Belgium, Drilling permits.

Water law in Belgium dictates that ground water rights belong to the overlying landowner. Extraction of water for industrial or municipal use must be licensed. Construction of trenches, sink wells or site pumps is prohibited near water courses. Abandonded wells, boreholes and drilling tunnels are under control of administrative authorities. Disposal of wastes therein is prohibited. Construction of mines, pits and quarries reaching a depth of 30 meters must be certified. All underground mining activities are required to submit a detailed description of the extraction site, equipment, and rate of pumping. All facilities of this nature must be constructed so as to allow measurement of water levels at all times. (Heiss-NWWA)
W76-11120

ENGLAND AND WALES, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United Nations, Rome (Italy).
In: Water Law in Selected European Countries, 1975. Vol 1, Chap IX, p 41-52, 4 ref.

Descriptors: *Water law, *Foreign countries, *Water rights, Groundwater, Administrative agencies, Water wells, Drilling, Europe, *Legislation, Mining, Water pollution control, Legal aspects.
Identifiers: *England, *Wales, Well placement, Drilling permits.

The water law in England and Wales dictates that water extracted from the ground belongs to the person who removed it and holds it in his possession. Extraction of ground water is subject to licensing by the water authority concerned. All wells exceeding 50 feet are required to be registered with the Natural Environment Research Council and must have documented well and operational logs. Construction of a well within a water authority area, which does not require a license must conform to a specification which guarantees non-interference with pre-existing wells, and notice must also be given to the water authority concerned. Similar notice must be given upon extension of a well or boring for the purpose of mineral extraction. (Heiss-NWWA)
W76-11121

FRANCE, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United States, Rome (Italy).
In: Water Law in Selected European Countries, 1975. Vol 1, Chap IX, p 67-69, 14 ref.

Descriptors: *Water law, *Foreign countries, *Water rights, Administrative agencies, Groundwater, Water wells, Drilling, Legal aspects, *Legislation, Water pollution control, Europe, Irrigation wells, Waste disposal wells.
Identifiers: *France, Drilling permits, Well placement, Commercial water wells.

The water law of France states that ground water rights belong to the overlying land owner. Water extracted by that land owner for domestic purposes requires no authorization. Tapping of underground waters for commercial purposes requires authorization. The authorization will dictate volumes of water extracted and conditions under which extraction is done. Extraction of water by a landowner for irrigation purposes is not applicable to provisions which allow for modification of the authorized water allocation or restriction of free sprinkle irrigation. Any extraction of ground water for non-domestic use must be registered and is subject to the supervision of the government administration. All abandoned well structures are also subject to government supervision. Disposal of any wastes in these abandoned structures is prohibited. Drilling and ground water extraction in areas designated as special water management zones is closely regulated by the zone Prefect. Major aquifer systems have been departmentalized. Drilling depths and ground water extraction rates have been standardized in an attempt to prevent aquifer depletion. Any mining activity or proposed gas storage area is liable for damage to aquifers which supply any public premises. (Heiss-NWWA)
W76-11122

ISRAEL, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United Nations, Rome (Italy).
In: Water Law in Selected European Countries, 1975. Vol 1, Chap IX, p 99-100, 4 ref.

Descriptors: *Water law, *Foreign countries, Administrative agencies, *Legislation Groundwater, Artificial recharge, Water wells, Drilling, Legal aspects, Water pollution control, Salinity, Mining, Recharge wells.
Identifiers: *Israel, Drilling permits.

The water law of Israel states that all well drilling activity requires a license issued by the Water Commissioner. Licenses are subject to cancellation or change no later than 60 days following the receipt of the required pumping test. A driller must be licensed by the Minister of Agriculture to test a well or pump it experimentally. A license is required in order to plug a well. A detailed procedural operating log of this activity is also required by the Commissioner. To prevent depletion or salinization of a water resource, or to protect domestic water supplies the Water Minister can deny drilling licenses, dictate well specifications and production rates or cancel a well license. Aquifer recharge licenses are required and granted only for specific purposes. The Minister of Agriculture has additional recharge regulations which are directed to improve water quality and increase supplies. Any recharge license application is open to a hearing of opposing views. The Water Commissioner may not approve any recharge project which may in any way endanger existing water supplies. The holder of a petroleum right under the petroleum law is regarded as the holder of a water drilling license. Mining activities must be petitioned to the Water Commissioner who is required to consult with the Controller of Mines so as to insure against interference with water resources. (Heiss-NWWA)
W76-11123

ITALY, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United Nations, Rome (Italy).
In: Water Law in Selected European Countries, 1975. Vol 1, Chap IX, p 136-138, 24 ref.

Descriptors: *Water law, *Foreign countries, *Water rights, Administrative agencies, Riparian rights, Groundwater, Water wells, Drilling, *Legislation, Europe, Water pollution control, Legal aspects, Thermal water, Mineral water.
Identifiers: *Italy, Drilling permits, Water resource protection districts.

Exploitation of ground water is subject to different legal authorities depending on whether the activities take place within or outside of water resources protection districts. Within water resource protection districts ground water exploration is subject to administrative authorization with the local Office of Civil Engineering. Identified ground water bodies are registered as public water by the Ministry of Public Works. Rights to exploit registered public ground water are subject to administrative conformation. The right to exploit non-public ground water is free for the Riparian landowner provided he observes legal distances and conditions of exploitation. Outside water resource protection districts ground water exploration is free. The right to use non-public ground waters outside water resources protection districts is equally free subject to the same limitations as apply to riparian landowners within such districts. The provinces of Trento and Bolzano are delegated as sovereign legislative powers in respect to mineral and thermal waters. Conditions of mineral and thermal water exploration within authorized areas are identical to those governing ground-water exploration. (Heiss-NWWA)
W76-11124

SPAIN, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United Nations, Rome (Italy).
In: Water Law in Selected European Countries, 1975. Vol 1, Chap IX, p 188-192, 12 ref.

Descriptors: *Water law, *Foreign countries, *Water rights, Administrative agencies, Groundwater, Water wells, Drilling, *Legislation, Legal aspects, Water pollution control, Europe, Thermal water, Mineral water.
Identifiers: *Spain, Drilling permits, Andalusia, The Baleares, Almeria, Mineral waters, Thermal waters.

Ground water may be designated as either public or private. Public underground waters are those extracted or flowing on public domain lands and those occurring under the bed and within one hundred meters on either side of public streams. Private underground waters are those being extracted or flowing on private land. Ground water exploration on public land requires an administrative license. Exploitation necessitates an administrative concession. Ground water extraction works may be implemented only outside a 40 meter distance from neighboring buildings, railways or roads and outside a 100 meter radius of another well, spring, water course or public animal watering place. The extraction of private underground waters is subject to an administrative authorization rather than to a concession. In contrast, water legislation applicable to the Canary Islands dictates that all extractions and diversions, whatever the type of water, always require the authorization of the Hydraulic Services of the Canary Islands and Santa Cruz de Tenerife. Following the same approach the private underground water legislation for Andalusia, the Baleares and Almeria prohibits all extraction and diversion works except for ordinary wells until regulatory laws have been established. Mineral waters are classified as (a) Mineral-Medicinal Waters, which, because of their characteristics and quality are declared of public interest; (b) Mineral-Industrial Waters which allow for the rational use of substances they contain; (c) Thermal Waters, the temperature of which exceeds by 40 degrees centigrade the mean temperature of the place of emergence. Mineral waters are controlled by the Ministry of Industry, the General Directorate of Health and the Ministries of Public Works and of Agriculture. (Heiss-NWWA)
W76-11125

TURKEY, (LEGISLATION ON UNDERGROUND WATERS).
Food and Agricultural Organization of the United States, Rome (Italy).
In: Water Law in Selected European Countries, 1975. Vol 1, Chap IX, p 236-237, 11 ref.

Descriptors: *Water law, *Foreign countries, *Water wells, Administrative agencies, Groundwater, Drilling, *Legislation, Legal aspects, Water pollution control.
Identifiers: *Turkey, *Drilling permits.

The water laws of Turkey dictate that all ground water exploration operations are to be undertaken in accordance with the specifications issued by the Ministry of Power and Natural Resources. The drilling of all wells requires a permit issued by the General Directorate of Hydraulic Works (GDHW). Once ground water has been found, its use is authorized immediately but is limited by the beneficial use criterion. In addition an application for the obtention of an exploitation permit is to be filed with the GDHW. The permit will state the authorized amount of water to be extracted and used. Public exploration or control wells may be sunk on private land without the requirements of expropriation and compensation, the transformation thereof into exploitation wells is subject to the expropriation of private land for the well itself and for related water conveyance installations. Control of aquifer depletion is administered by the Ministry of Power and Natural Resources. Although the drilling of wells for purposes other than Water Resource exploitation does not require a water use permit, the GDHW does request information from such well operators so as to preclude interference and contamination of adjacent ground water supplies. (Heiss-NWWA)
W76-11126

VILLAGE WATER SUPPLY, A WORLD BANK PAPER.
International Bank for Reconstruction and Development, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11143

COST-BENEFIT ANALYSIS, PROPERTY RIGHT SPECIFICATION AND 'DISTRIBUTION',
Rand Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 6B.
W76-11162

SOME ISSUES REGARDING REGULATORY POLICY, POLITICAL PARTICIPATION, AND SOCIAL IMPLICATIONS OF GEOTHERMAL RESOURCE DEVELOPMENT IN THE IMPERIAL VALLEY,
Center for Social and Behavioral Science Research. University, Riverside, California.
P. S. Green, and M. F. Steinberger.
Available from the National Technecial Information Service, Springfield, Va 22161, as PB-256 569, $4.50 in paper copy, $3.00 in microfiche. Working Papers in Public Policy, February, 1976, 54 p. (California Water Resources Center Project UCAL-WRC-W-344)

Descriptors: *Geothermal studies, *Attitudes, *Social aspects, *Economic impact, Decision making, *California, *Regulation, Water policy, Social participation, Political aspects, State governments, Local governments, Land use, Legislation.
Identifiers: *Imperial Valley(Calif).

In order to delineate social and political issues relating to geothermal development, certain local government officials and community leaders in the Imperial Valley were interviewed on their perceptions of the potential of geothermal resources and regulatory problems implicit in development. County officials exhibited a strong belief that they had an 'overall responsibility' for the general welfare of the residents of Imperial County who would be affected by the potential economic, social, and environmental impacts of geothermal development. With little coordination among agencies at higher levels of government, County officials looked upon County regulations and coordination as a positive force that could: (1) minimize the negative impacts of geothermal development (2) encourage multipurpose utilization of geothermal resources, and (3) improve land use planning within their jurisdiction. Recommendations for improving the regulatory process include organizational and procedural changes and amendments to state energy legislation. Suggestions for improving public input into the governmental decision making process were presented in order to make geothermal regulations a joint effort of commercial developers, public officials, and private citizens. (Snyder - California, Davis)
W76-11328

DEVELOPMENT OF REGIONAL WATER MANAGEMENT SYSTEMS OPERATIONAL PROCEDURES,
University of Southern Mississippi, Hattierburg, Bureau of Business Research.
D. J. Etzold, and D. C. Williams, Jr.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 571, $4.00 in paper copy, $3.00 microfiche. Mississippi Water Resources Research Institute, Mississippi State, Completion Report, July 1976. 37 p, 1 tab, 9 ref, append. OWRT A-094-MISS (1).

Descriptors: Regional development, Management, *Water supply development, *Mississippi, *Regional analysis, *Institutional constraints, State governments, Local government.

The purpose was to identify multigovernmental constraints inherent in regional water supply development and to generate an organizational and procedural framework. There is some discussion of current water supply problems in southeast Mississippi, in general, and Jackson County, in particular. Governmental agencies with water development and management jurisdiction in Jackson County are identified. Thirteen officials and professionals were interviewed for the purpose of deriving their views on development of a regional water supply system. The results of the interviews are summarized. An organizational and procedural framework is discussed.
W76-11329

EVALUATION OF PRIOR APPROPRIATION IN MISSISSIPPI,
Mississippi State Univ., Mississippi State. Water Resource Research Inst.
L. O. Putt.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 581, $4.50 in paper copy $3.00 in microfiche. Completion Report, July 1976, 51 p. OWRT A-092-MISS(1).

Descriptors: Water law, *Prior appropriation, *Mississippi, Legal aspects, *Water rights, *Riparian rights, Permits, *Regulation, State governments, *Diversion, Administration.

Surface water rights and the administration of Mississippi's water appropriation system are discussed. Mississippi has adopted a prior appropriation system to regulate the use of surface waters. A permit system was initiated to protect vested riparian rights and to prohibit the total depletion of stream flow. However, riparians may not exercise their rights without either a judicial determination of their rights or a permit to exercise them. A water right under the Mississippi prior appropriation system, whether it belongs to a riparian claimant or a permittee, is defined as a certain maximum quantity of water, to be diverted at a certain maximum rate of diversion, during a stated time, at a specific point of diversion, applied to a specific parcel of land for a specified purpose. There is a priority system established for permittees in terms of time but none for use and almost any use could be beneficial use as long as the Board of Water Commissioners approves it. Ground water and diffused surface water sources are specifically excluded from the law. Domestic uses are excluded as are operations for the dredging or washing of sand and gravel. The prior appropriation system in Mississippi even with its comprehensiveness and flexibility, is subject to various criticisms.
W76-11336

ESTABLISHING INSTREAM FLOWS: ANALYSIS OF THE POLICY-MAKING PROCESS IN THE PACIFIC NORTHWEST,
Washington State Univ., Pullman. Dept. of Political Science.
For primary bibliographic entry see Field 6B.
W76-11339

STATUS OF THE NPDES (NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM) IN THE SOUTHEAST,
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5G.
W76-11371

LEGAL INSTITUTIONS FOR THE ALLOCATION OF WATER AND THEIR IMPACT ON COAL CONVERSION OPERATIONS IN KENTUCKY,
Kentucky Univ., Lexington.
R. C. Ausness, G. W. Callahan, S. W. Dills, B. H. Flynn, and J. S. Gillig.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 796 $7.50 in paper copy, $3.00 in microfiche. Kentucky Water Resources Research Institute, Lexington, Research Report No. 95, August 1976. 186 p, 3 fig., append. OWRT A-060-KY(2), 14-31-0001-5017, 14-34-0001-6018.

Descriptors: Legal aspects, Legislation, Water law, *Water policy, Water resources development, *Kentucky, Water rights, Riparian rights, Prior appropriation, *Water allocation(Policy), *Consumptive use, *Regulation, *Water permits, Legislation.
Identifiers: *Coal conversion operations, *Administrative permit system.

The conversion of coal into other types of fuel through gasification and liquefaction has been proposed as a means of coping with America's increasing energy needs. Coal conversion plants require large quantities of water for cooling purposes and for use as a raw material. Three types of water allocation are presently used in the United States, riparianism, prior appropriation, and administrative permit systems. The common law riparian system is undesirable because under it water rights are insecure and subject to locational use restrictions. Prior appropriation is better, but the permanent water right created under this system results in excessive rigidity. A system of administrative regulation by means of a consumptive use permit system offers the best allocation framework for both coal conversion facilities and other water users as well. Kentucky presently has such a system of administrative allocation. However this legislation could be improved by (1) clarifying the planning functions of the Department for Natural Resources and Environmental Protection and the Water Resources Authority; (2) expanding the scope of the consumptive use permit system by removing most of the exempted use categories; (3) adopting beneficial use as the basis upon which consumptive use permits will be granted; (4) imposing a durational limit on water use permits and delineating renewal procedures; (5) adopting a scheme for transfers of water rights. (Huffsey-Kentucky)
W76-11489

MANAGEMENT OF WATER RESOURCES UNDER DIFFERENT SOCIO-ECONOMIC CONDITIONS,
Arizona University, Tucson, Committee on Arid Lands Resources.
For primary bibliographic entry see Field 6B.
W76-11514

ENVIRONMENTAL ASSESSMENT OF MARINE OUTFALLS,
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5E.
W76-11615

MAN DISCOVERS THE COASTAL ENVIRONMENT: A FOOTPRINT IN THE SAND,
North Carolina State Univ. at Raleigh. University Studies.
For primary bibliographic entry see Field 5D.
W76-11621

6F. Nonstructural Alternatives

LAND PRICES IN FLOOD HAZARD AREAS: APPLYING METHODS OF LAND VALUE ANALYSIS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agricultural Economics.
D. Damianos, and L. A. Shabman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-256 233 $4.00 in paper copy, $3.00 in microfiche. Virginia Water Resources Research Center, Blacksburg, Bulletin 95, April, 1976. 48 p, 2 tab, 3 fig, 50 ref, append. OWRT A-054-VA(3).

Descriptors: *Flood control, Management, Economics, Land use, *Prices, Risks, *Flood plain insurance, Non-structural alternatives, *Flood damage, *Flood plain zoning, Market value, Statistical methods.
Identifiers: Flood insurance programs, *Flood hazard, *Residential land prices.

A case study approach was used to examine the influence on residential land prices of two factors: (1) the presence of flood risk, and (2) the employment of structural or non-structural measures designed to minimize flood losses. The purpose was to see whether the influence of such factors on land price could be isolated. Information of this kind would be useful in developing flood management policies that could lead to public support of the most efficient mix of alternative for reducing flood damages. The market value of land, as used in this study, is defined within the context of an economic theory of land rent. The principal effort of the investigation was a statistical analysis of land sale prices directed toward isolating the influence of flood hazard. Two separate techniques of land value analysis were used. Results were generally consistent with the hypothesis that land sale prices directed toward isolating the influence of flood hazard. Two separate techniques of land value analysis are used. Results were generally consistent with the hypothesis that land sale price is negatively related to the potential of flood damage, and that erection of structural flood control measures enhances land prices. However, it was impossible to isolate the influence of floodplain zoning measures on land prices. For this and

other reasons the results are not considered conclusive enough to support definitive policy conclusions. As a guide to further research in this area, the techniques used in this study are critiqued and certain conclusions are drawn.
W76-11112

A MATRIX APPROACH FOR DETERMINING WASTEWATER MANAGEMENT IMPACTS,
Weston (Roy F.), New York.
For primary bibliographic entry see Field 5G.
W76-11128

COST SHARING TO INDUCE EFFICIENT TECHNIQUES OF ABATING WASTEWATER POLLUTION,
National Bureau of Standards, Washington, D.C., Building Economics Section.
For primary bibliographic entry see Field 5G.
W76-11135

FLOOD PLAIN INFORMATION: KASKASKIA RIVER, BEAR CREEK, LAKE FORK CREEK, WEST FORK CREEK AND 'A' CREEK, DOUGLAS COUNTY, ILLINOIS, NO. 1.
Army Engineer District, St. Louis, Mo.
For primary bibliographic entry see Field 4A.
W76-11341

FLOOD PLAIN INFORMATION: LAKE MONROE, NEAR SANFORD, FLORIDA.
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 4A.
W76-11342

FLOOD PLAIN INFORMATION: NORTHEAST VOLUSIA COUNTY, FLORIDA.
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 4A.
W76-11343

FLOOD PLAIN INFORMATION: SWIFT CREEK, MACON AND BIBB COUNTY, GEORGIA.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 4A.
W76-11344

FLOOD PLAIN INFORMATION: WAYCROSS DRAINAGE CANAL, WAYCROSS AND WARE COUNTY, GEORGIA.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 4A.
W76-11345

FLOOD PLAIN INFORMATION: BUCK CREEK AND GRASSY CREEK, MARION COUNTY, INDIANA,
Army Engineer District, Louiville, Ky.
For primary bibliographic entry see Field 4A.
W76-11346

FLOOD PLAIN INFORMATION: KENAI RIVER, PHASE II, KENAI PENINSULA BOROUGH, ALASKA,
Army Engineer District, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W76-11347

FLOOD PLAIN INFORMATION: FISHER CREEK, SANTA CLARA COUNTY, CALIFORNIA,
Army Engineer District, San Francisco, Calif.
For primary bibliographic entry see Field 4A.
W76-11348

FLOOD PLAIN INFORMATION: ALAMITOS CREEK, INCLUDING GUADALUPE CREEK-ARROYO CALERO AND SANTA TERESA CREEK, SANTA CLARA COUNTY, CALIFORNIA,
Army Engineer District, San Francisco, Calif.
For primary bibliographic entry see Field 4A.
W76-11349

FLOOD PLAIN INFORMATION: DEER CREEK AND WHITE RIVER, EARLIMART, CALIFORNIA,
Army Engineer District, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W76-11350

FLOOD PLAIN INFORMATION: GREEN VALLEY, DAN WILSON, AND SUISUN CREEKS, CORDELIA, CALIFORNIA.
Army Engineer District, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W76-11351

FLOOD PLAIN INFORMATION: CACHE LA POUDRE RIVER, COLORADO, VOL. III. FORT COLLINS-GREELEY-LARIMER-WELD COUNTY.
Army Engineer District, Omaha, Nebr.
For primary bibliographic entry see Field 4A.
W76-11352

FLOOD PLAIN INFORMATION: WABASH RIVER, MIAMI COUNTY AND PERU, INDIANA.
Army Engineer District, Louisville, Ky.
For primary bibliographic entry see Field 4A.
W76-11353

FLOOD PLAIN INFORMATION: POGUES RUN, PLEASANT RUN, AND BEAN CREEK, MARION COUNTY, INDIANA.
Army Engineer District, Louisville, Ky.
For primary bibliographic entry see Field 4A.
W76-11354

FLOOD PLAIN INFORMATION: LICK CREEK AND LITTLE BUCK CREEK, MARION COUNTY, INDIANA.
Army Engineer District, Louisville, Ky.
For primary bibliographic entry see Field 4A.
W76-11355

FLOOD PLAIN INFORMATION: LITTLE ARKANSAS RIVER AND SAND CREEK, SEDGWICK, KANSAS.
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W76-11356

FLOOD PLAIN INFORMATION: BIG SANDY RIVER, BOYD COUNTY, KENTUCKY.
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 4A.
W76-11357

FLOOD PLAIN INFORMATION: QUINEBAUG RIVER - CADY BROOK, TOWN OF SOUTHBRIDGE, MASSACHUSETTS.
Army Engineer District, Waltham, Mass.
For primary bibliographic entry see Field 4A.
W76-11358

FLOOD PLAIN INFORMATION: MERRIMACK RIVER, CITY OF CONCORD, NEW HAMPSHIRE.
Army Engineer District, Waltham, Mass.
For primary bibliographic entry see Field 4A.
W76-11359

FLOOD PLAIN INFORMATION: ALUM CREEK, VICINITY OF COLUMBUS, OHIO.
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 4A.
W76-11360

FLOOD PLAIN INFORMATION: SOUTH FORK RIVANNA RIVER, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W76-11361

6G. Ecologic Impact Of Water Development

POLITICAL RESOLUTION OF ENVIRONMENTAL CONFLICTS,
Waterloo Univ. (Ontario). Dept. of Systems Design.
K. W. Hipel, R. K. Ragade, and T. E. Unny.
Water Resources Bulletin, Vol. 12, No. 4, p 813-827, August 1976. 2 fig, 9 tab, 17 equ, 4 ref.

Descriptors: *Water resources, *Management, *Water pollution, *Political aspects, *Decision making, *Linear programming, Economic feasibility, Treatment facilities, Optimization, Wastes, Sewers, Environmental control, Equations, Mathematical models, Systems analysis.
Identifiers: *Metagame analysis, Bargaining process, Profit maximization.

Many water resources management problems ultimately require a political decision in order to formulate a course of action to follow. Metagame analysis is a nonquantitative technique that can model the decision-making process and is used herein to arrive at a politically feasible solution to a typical water pollution problem. The output from the linear programming formulation of the problem is used as input to the 'political' metagame analysis. This allows a solution to the pollution conflict that is not only physically and economically feasible according to the linear programming analysis, but politically feasible as well. (Bell-Cornell)
W76-11129

IMPACT STATEMENT FOR THE AQUATIC PLANT-CONTROL PROGRAM-STATE OF TEXAS,
Army Engineer District, Galveston, Tex.
C. Novosad, W. T. Nailon, and E. O. Gangstad.
In: Aquatic Plant Control Program: Integrated Control of Alligator Weed and Water Hyacinth in Texas, Army Engineer Waterways Experiment Station, Vicksburg, Miss., Technical Report No. 9, March 1975, p. B3-B8. 6 ref.

Descriptors: *Aquatic weed control, *Herbicides, *Environmental effects, *Water hyacinth, *Alligatorweed, *Texas, Biocontrol, 2,4-D, Chemcontrol, Water pollution control, Toxicity, Safety, Spraying, Pesticide residues, Potable water, Biodegradation, Hazards.
Identifiers: Silvex, Environmental Impact Statement, Agasicles hygrophila.

The environmental impact of the Texas water hyacinth and alligator weed control program is evaluated. The program is restricted to the use of Agasicles hygrophila, the flea beetle for alligator weed control and one of the amine salts and the butoxyethanol ester of 2,4-D; some critical areas will be controlled with the PGBEE of silvex. The beneficial effects are that weed elimination will improve water quality, reduce impediments to navigation, flood control, irrigation, and recreation, and aid fish and wildlife management and disease-vector control. There are no known detrimental effects of 2,4-D usage. The adverse effect may be that dying vegetation may temporarily deplete the dissolved oxygen and deleterious to fish. The

amine salt and butoxyethanol ester of 2,4-D are extremely toxic to many broadleaf plants but suitable application methods, observance of season, and atmospheric conditions will minimize drift. Precautions will be taken to keep 2,4-D concentrations in water below 0.5 ppm near estuaries. Treatment may be needed to remove tastes and odors inducted by the herbicides in potable water; but 2,4-D does not degrade to form 2,4-dichlorophenol and does not impair drinking water when used according to prescribed limitations. (See also W76-11145) (Auen-Wisconsin)
W76-11146

ENVIRONMENTAL POLICY COSTS: DEFINITION, MEASUREMENT, AND CONJECTURE,
California Univ., Riverside.
For primary bibliographic entry see Field 5G.
W76-11159

VALUING LONG-RUN ECOLOGICAL CONSEQUENCES AND IRREVERSIBILITIES,
Maryland Univ., College Park. Dept. of Economics.
A. C. Fisher, and J. V. Krutilla.
In: Cost Benefit Analysis and Water Pollution Policy, Environmental Protection Agency and Urban Institute Symposium, September 5-7, 1973, Annapolis, Md. Published in 1975, p. 271-290. 25 ref.

Descriptors: *Cost-benefit analysis, *Pollution abatement, *Evaluation, *Environmental effects, *Conservation, Theoretical analysis, Investment, Welfare(Economics), Discount rates, Projections, Decision making, Protection.
Identifiers: *Evaluation of irreversible pollution, Option value.

A theoretical approach, illustrated by examples, considers the nature and the implications, for economic theory and policy, of investments in water (and other) resources that may involve adverse effects on the physical environment that are either difficult or impossible to reverse. The problem has a duality in that investments in abatement of environmental disruption are made within some known period of time, 'not investing' is then irreversible, in the sense that if the investment in abatement is not made within this period, it will not be possible to make it and to capture the benefits later. The discussion attempts to indicate the nature of the long-run or irreversible ecological consequences--how they differ from the consequences of ordinary economic decisions, and to derive some modeled implications for policy with respect to investments which can either give rise to these irreversible effects or, alternatively, avert them. Related issues such as the choice of welfare criteria, the choice of discount rate, the role of uncertainty, and option value are also considered. (See also W76-11153) (Auen-Wisconsin)
W76-11161

PROCEEDINGS OF THE SYMPOSIUM ON OFFSHORE OIL POTENTIAL AND RELATED LAND USE IMPACTS IN THE CENTRAL CALIFORNIA COASTAL ZONE.
California Univ., Santa Cruz, Coastal Marine Lab.
Proceedings of the Symposium on Offshore Oil Potential and Related Land Use Impacts in the Central California Coastal Zone, held Santa Cruz, Calif. on June 8, 1975. Also as Calif. Univ. Coastal Marine Studies Special Publication No. 3. Doyle, W. T. (ed.)

Descriptors: *Continental shelf, Resources development, *Oil industry, Water resources, *Environmental effects, Drilling, Offshore platforms, *California, *Land use, Legal aspects.
Identifiers: *Outer Continental Shelf, Offshore technology.

The proceedings includes presentations and question and answer remarks from a symposium held on June 8, 1975, at the University of California/Santa Cruz. Following opening remarks papers were presented on: Tectonic and Basin Development of the Central California Coastal Area by Eli Silver; Estimating Potential Oil Resources in the Central California Coastal Zone by James Taylor; Offshore Petroleum Extraction and Onshore Facilities by Darrell Warner; Potential Land Use Conflicts Resulting from Offshore Drilling in the Central California Coastal Area by James Pepper; Legal Issues of Regulating the Coast by Gerald Bowden; and Panel Question and Answer Session by all authors. (Sinha - OEIS)
W76-11461

RANDOM MODEL OF EVAPORATION OF OIL AT SEA,
Mathematica, Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 5B.
W76-11462

THE ALERT BAY OIL SPILL: A ONE-YEAR STUDY OF THE RECOVERY OF A CONTAMINATED BAY,
Environment Canada, Victoria, B. C. (Canada). Marine Sciences Directorate, Pacific Region.
For primary bibliographic entry see Field 5C.
W76-11463

MODELING THE FATES OF METALS IN OCEAN-DISCHARGED WASTEWATERS,
Southern California Coastal Water Research Project, El Segundo.
For primary bibliographic entry see Field 5B.
W76-11464

TEXAS COASTAL MANAGEMENT PROGRAM. HEARING DRAFT. EXECUTIVE SUMMARY.
Texas General Land Office, Austin.
For primary bibliographic entry see Field 6B.
W76-11465

TEXAS COASTAL MANAGEMENT PROGRAM. HEARING DRAFT.
Texas General Land Office, Austin.
For primary bibliographic entry see Field 6B.
W76-11466

TEXAS COASTAL MANAGEMENT PROGRAM. HEARING DRAFT. APPENDICES.
Texas General Land Office, Austin.
For primary bibliographic entry see Field 6B.
W76-11467

FLORIDA COASTAL POLICY STUDY: THE IMPACT OF OFFSHORE OIL DEVELOPMENT,
Florida State Univ., Tallahassee. Dept. of Urban and Regional Planning.
A. L. Pearman, and J. W. Stafford.
Florida State University and University of South Florida, Final Report, December 1975. (Reprinted: June, 1976). 273 p, 114 ref.

Descriptors: *Continental shelf, *Oil spills, *Oil pollution, *Resources development, *Environmental effects, *Offshore platforms, *Florida, Water resources, Pipelines, Drilling, Aquatic environment, Aquatic habitats, Aquatic life, Estuaries, Bays, Coasts, Exploration, Exploitation, Fish, Reptiles, Mammals, Remote sensing, Grasses.
Identifiers: *Outer Continental Shelf, *Deepwater ports, Environmental impacts, Coastal management.

Offshore oil and gas developments are examined from a number of perspectives: economic, environmental, legal, and social. The study is designed to identify a set of policy alternatives which can be implemented to guide and regulate onshore developments so as to minimize the adverse impacts upon the areas most directly effected. The analysis of onshore impacts is based, in part, upon a review of similar developments in other coastal areas. The development of an information base which can be applied to potential developments in Florida is viewed as an essential element of this study. The main report consists of ten chapters which present the major findings and recommendations of the study. The ten chapters are: Introduction; Review of Offshore Exploration in Florida; Facilities Associated with Offshore Oil and Gas Development; Socio-Economic Impacts of Offshore Oil and Gas Development: A Scenario; The Impact on Local Government Revenues and Expenditures; Environmental Impacts of OCS Oil and Gas Activity; Environmental Impacts and Monitoring of Oil and Gas Pipelines; A Technical Note; Deepwater Ports: Policy Issues in Florida; Offshore Reserves and Fuel Availability; and Conclusions and Recommendations. The general conclusion derived from a review of the potential environmental impacts of OCS oil related activity is that planning can minimize the negative environmental impacts by: prohibiting the most offensive or troublesome activities; controlling the location of activities permitted and controlling the volume and frequency of operations potential posing critical threats of environmental degradation. (See also W76-11469 thru W76-11474) (Sinha - OEIS)
W76-11468

INTRODUCTION,
Florida State Univ., Tallahassee. Dept. of Urban and Regional Planning.
A. L. Pearman.
In: Florida Coastal Policy Study: The Impact of Offshore Oil Development, December 1975. p. 1-30, 1 fig, 5 tab, 4 maps.

Descriptors: *Continental shelf, *Environmental effects, *Resources development, Water resources, *Oil industry, *Florida, *Regulation, Coasts, Baseline studies, Economics, Exploration, Facilities.
Identifiers: *Outer Continental Shelf, *Coastal Zone Management.

The impacts which may be imposed on Florida communities would be generated by the activities necessary to discover and develop offshore reserves. The development of OCS oil and gas resources can be divided into the following distinct activities: Geophysical exploration, exploratory drilling utilizing specialized mobile drilling rigs; installation and operation of specialized fixed production platforms; and transportation of offshore production of oil by tanker, barge or pipeline. Each phase of offshore activity requires the establishment and maintenance of onshore support facilities. The specific facilities required will vary with the phase of OCS activity. The processes which are utilized to discover and develop OCS reserves place Florida primarily in a reactive position. The timing of OCS lease sales is a decision ultimately made at the federal level. Development of offshore reserves is the result of private decisions which may be constrained by federal and state regulation. The role played by state and local governments in reacting to potential impacts of offshore development must currently be based upon the regulation of onshore (and nearshore) activities. (See also W76-11468) (Sinha - OEIS)
W76-11469

REVIEW OF OFFSHORE EXPLORATION IN FLORIDA,
University of South Florida, Tampa. Dept. of Geography.
J. W. Stafford.
In: Florida Coastal Policy Study: The Impact of Offshore Oil Development, December 1975. p 31-53, 3 fig, 6 tab, 1 map.

Descriptors: *Florida, *Continental shelf, *Oil industry, *Environmental effects, *Resources

development, Water resources, *Economic impact, Economics, Exploration, Exploitation, Leases, Facilities.
Identifiers: *Outer Continental Shelf, Territorial waters, Gas industry, Policies, Petroleum, Coastal Zone Management.

The nature and characteristics of offshore and onshore facilities associated with exploratory activity is specifically examined. The impacts of exploratory activity on Florida communities are also discussed. The United States Government's second lease sale of acreage in the eastern Gulf of Mexico off Mississippi, Alabama and Florida, the so-called MAFLA area in 1973 is of special interest to Florida because of the 87 tracts, 62 are located adjacent to state waters. The relatively small, but positive, economic impact of OCS exploration on Florida coastal communities is in contrast to the reduction in possible state revenues resulting from the failure of recent exploratory efforts initiated by the MAFLA sale. The changing valuation of Florida offshore tracts suggest that the timing of state lease sales may be critical. However the risks and uncertainties which characterize policies permitting and encouraging rapid exploitation of state offshore lands are likely to be unacceptable for a state which places a high value on maintaining a high level of environmental quality. A more cautious leasing policy would be based upon an evaluation of any OCS discoveries prior to any extensive exploration of state lands. This approach would permit the incorporation of exploitation of state lands into an existing infrastructure designed to accomodate offshore activity. The current low valuation of Florida offshore lands suggests that a more cautious state leasing policy involves, at the worst, relatively small potential sacrafice in terms of foreign revenues. (See also W76-11468) (Sinha - OEIS)
W76-11470

ENVIRONMENTAL IMPACTS OF OCS OIL AND GAS ACTIVITY,
University of South Florida, Tampa. Dept. of Geography.
J. W. Stafford.
In: Florida Coastal Policy Study: The Impact of Offshore Oil Development, December 1975. p 131-162, 4 tab.

Descriptors: *Continental Shelf, *Florida, *Environmental effects, *Resources development, Oil spills, *Oil pollution, Oil fields, Oil industry, Exploration, Transportation, Aquatic life, Wetlands, Beaches, Archaeology, Commercial fisheries, Navigation, Facilities, Tourism.
Identifiers: *Outer Continental Shelf, *Environmental impact, Gas fields, Refineries, Coastal Zone Management.

Development of outer continental shelf oil and gas fields involves geophysical exploration, exploratory drilling, production, transportation, storage, and processing. Each of these activities has environmental impacts associated with it. The impacts on the physical environment are usually negligible during geophysical exploration. However, the impacts associated with the various other phases of oil and gas activities can be very significant. The Department of Interior lists eight impact-producing factors and ten impact-sustaining factors resulting from OCS operations. In anticipation of possible discoveries of major oil and gas deposits in the eastern Gulf of Mexico off the Florida Coast each of these impact-producing and impact-sustaining factors should be considered. Certain aspects of oil and gas operations can cause adverse environmental effects which may be considered unavoidable with current operation practices, technology and regulations. Included in this category are the environmental effects on air and water quality, marine organisms, wetlands, beaches, and aesthetic values; damage to historical and archaeological sites, structures, and objects; interference with commercial fishing operations and ship navigation, and conflict with other uses of land. (See also W76-11468) (Sinha - OEIS)
W76-11471

ENVIRONMENTAL IMPACTS AND MONITORING OF OIL AND GAS PIPELINES: A TECHNICAL NOTE,
University of South Florida, Tampa. Dept. of Geography.
L. Limoges.
In: Florida Coastal Policy Study: The Impact of Offshore Oil Development, December 1975. p 163-191, 3 tab.

Descriptors: *Florida, *Continental Shelf, *Resources development, *Environmental effects, *Oil industry, Pipelines, Estuaries, Marshes, Aquatic life, Remote sensing, Monitoring.
Identifiers: *Outer Continental Shelf, Gas industry, Coastal zone management, *Environmental impact, Pipeline corridors.

The possible effects of pipeline corridors in both estuarine and marshland environments in Florida are evaluated. The discussion includes information on the survey of sediment deposits and terrestrial and marine life as applied to the selection of possible corridor routes. The potential impact of pipeline construction activity and the various techniques for monitoring the designation of sites as well as the projected completed pipelines are outlined. Details are given on remote sensing techniques for designating and monitoring pipeline corridors. (See also W76-11468) (Sinha - OEIS)
W76-11472

DEEPWATER PORTS: POLICY ISSUES IN FLORIDA,
Florida State Univ., Tallahassee Dept. of Urban and Regional Planning.
A. Dzurik.
In: Florida Coastal Policy Study: The Impact of Offshore Oil Development, December 1975. p 193-222, 3 tab, 1 map.

Descriptors: *Florida, *Continental Shelf, *Oil industry, *Resources development, Water resources, Water resources, *Environmental effects, Coasts, Facilities.
Identifiers: *Outer Continental Shelf, *Supertankers, *Deepwater ports, Refineries, Onshore facilities, Gas industry, Coastal Zone Management.

An overview of the possible use of supertankers off Florida's shores is provided. Policy issues associated with deepwater ports are specifically dealt with. It is concluded that the potential for deepwater port development is closely tied to the needs and expectations of the petroleum industry, but it is also subject to economic, legal and political constraints. Without major refineries, the development of deepwater ports is unlikely in Florida. (See also W76-11468) (Sinha - OEIS)
W76-11473

BUREAU OF LAND MANAGEMENT'S ENVIRONMENTAL STUDIES PROGRAM FOR THE SOUTH ATLANTIC OUTER CONTINENTAL SHELF AREA. CONFERENCE/WORKSHOP PROCEEDINGS,
Research Triangle Inst., Research Triangle Park, N. C.
Held at Atlanta, Georgia, October 1975, Published in February 1976. 283 p. Massoglia, M. F. (Compiler)

Descriptors: *Continental Shelf, *Resources development, *Environmental effects, *Baseline studies, *Water pollution, *Conferences, *Estuarine environment, Management, Geology, Fisheries, Alaska, Oceanography, Ecosystems, Biology, Physical properties, Land management.
Identifiers: *Outer Continental Shelf, South Atlantic OCS, U.S. Southeast Coast, Georgia Embayment, Georgia Bight, Environmental impact.

The objectives of the conference/workshop, 'Bureau of Land Management's Environmental Studies Program for the South Atlantic Outer Continental Shelf Area,' were: To provide a summary of available related information and understanding for the South Atlantic Outer Continental Shelf area. To provide any predictions presently possible of the effects of drilling (exploration and development) on the environment of this area. To identify subject areas in which additional information is required for reasonable prediction and understanding for the environmental effects of drilling in this area. And to formulate recommendations for baseline studies and monitoring which will help to adequately determine the environmental effects of any oil and gas exploration and development in the South Atlantic Outer Continental Shelf area. The report contains a compilation of presentation and discussions of the conference/workshop. Pertinent papers are separately abstracted. (See W76-11475 thru W76-11485) (Sinha - OEIS)
W76-11474

THE DEPARTMENT OF THE INTERIOR'S OUTER CONTINENTAL SHELF LEASING PROGRAM,
Bureau of Outdoor Recreation, Atlanta, Ga. Southeast Regional Office.
J. Whelan.
In: Bureau of Land Management's Environmental Studies Program for the South Atlantic Outer Continental Shelf Area, Conference/Workshop Proceedings, Feb 1976. p 11-14.

Descriptors: *Environmental effects, *Baseline studies, *Resources development, Leases, *Continental Shelf, *Oil industry, Water resources.
Identifiers: *Outer Continental Shelf, Environmental impact, Gas industry.

As a result of the OCS Lands Act of 1953, the Department of the Interior is responsible for managing and developing the mineral resources of the Outer Continental Shelf. The Department has formulated three major goals for the comprehensive management of the OCS. They are: Orderly development of marine mineral resources to meet the energy demands of the Nation; protection of the marine coastal environment; and receipt of fair market value for the leased mineral resources. The OCS Research Management Board was created in March 1974 by the Secretary to design and implement baseline environmental studies and data-gathering and monitoring activities relating to oil and gas development on the Outer Continental Shelf. Development of the energy resources on the OCS will provide substantial benefits to the entire country in terms of secure supplies of oil and gas. However, the Department does recognize that there are risks and potential costs associated with offshore development. (See also W76-11474) (Sinha-OEIS)
W76-11475

FRAMEWORK FOR BUREAU OF LAND MANAGEMENT PROGRAMS,
Bureau of Land Management, Washington, D.C. Outer Continental Shelf Environmental Studies Program.
F. C. Monastero.
In: Bureau of Land Management's Environmental Studies Program for the South Atlantic Outer Continental Shelf Area, Conference/Workshop Proceedings, Feb 1976. p 15-24.

Descriptors: *Environmental effects, *Baseline studies, *Resources development, *Oil industry, *Estuarine environment, *Wetlands, Land management, Leases, Management, Pipelines.
Identifiers: *Outer Continental Shelf, Environmental impact, Nearshore environments.

The Environmental Studies Project encompasses a wide variety of field, laboratory, and review stu-

dies designed to gather information about the physical, chemical, biological, and geological aspects of the OCS, nearshore, and wetland/estuarine environments. It was established to support the BLM OCS-leasing program by providing data on which more informed management decisions could be based. Information from these studies can be (and is) used for tract selection, environmental impact statement (EIS) preparation, and preparation of special lease stipulations before leasing. After leasing, the data are used for assessing changes resulting from exploration and development activities; this information will affect operating orders, in the short turn, and, in the long turn, will be the basis for modification of leasing and operating regulations and for pipeline management. (See also W76-11474) (Sinha-OEIS)
W76-11476

SOUTHEAST COASTAL RESEARCH ACTIVITIES OF ERDA,
Division of Biomedical and Environmental Research (USERDA), Washington, D. C.
W. O. Forster.
In: Bureau of Land Management's Environmental Studies Program for the South Atlantic Outer Continental Shelf Area, Conference/Workshop Proceedings, Feb 1976. p. 29-37, 5 tab.

Descriptors: *Continental Shelf, *Ecosystems, *Resources development, *Oil industry, *Water resources, *Environmental effects, Leases, Land management, Coasts, Geology, Biology, Geochemistry, Oceanography, *Southeast U.S.
Identifiers: *Outer Continental Shelf, South Atlantic Coast, Georgia Bight.

The research program that ERDA is developing on the southeast coast is complimentary, not competitive with BLM's plans. The individual components of the overall southeast coastal program are the physical, the geochemical, the geological, and the biological programs. Each of the four programs has an emphasis on the time-related function aspect of the coastal zone as a system. The attempt is to describe the causes of such conditions. The geochemical transport program emphasizes the attempt to try to elucidate the causes of these particular parameters. The biological oceanography program is perhaps the most important of all. The impact of any activities in the coastal zone will have to be assessed in terms of the biological oceanographic aspect. The program that evolved is divided into five categories: hydrodynamic modeling; physical, geochemical, and biological oceanography; and the coordination of these projects. These studies must be multidisciplinary, laboratory, field, and experimental-ecosystems type. The environmental impacts will be greater with petroleum discharge and impacts on the nearshore area rather than offshore; therefore, highest priority for chronic effects studies should be in the nearshore zone. (See also W76-11474) (Sinha-OEIS)
W76-11477

THE ALASKAN OUTER CONTINENTAL SHELF ENVIRONMENTAL ASSESSMENT PROGRAM,
National Oceanic and Atmospheric Administration, Boulder, Colo. Outer Continental Shelf Environmental Assessment Program.
D. A. Wolfe.
In: Bureau of Land Management's Environmental Studies Program for the South Atlantic Outer Continental Shelf Area, Conference/Workshop Proceedings, Feb 1976. p 39-53, 2 fig.

Descriptors: *Continental Shelf, *Alaska, *Environmental effects, *Ecosystems, *Oil industry, *Baseline studies, *Resources development, Land management, Monitoring, Leases, Biology, Geology, Chemistry, Oceanography, Water resources.
Identifiers: *Outer Continental Shelf, Gas industry, Environmental impact.

The baseline studies for the Alaskan OCS are being managed for the Bureau of Land Management entirely by NOAA. NOAA is responsible for designing the research program, contracting for the research projects, monitoring progress, assuring quality of the data, and performing the analyses to be contained in the reports to BLM. The objectives of the Outer Continental Shelf Environmental Assessment Program are: Identify critical species, habitats, and processes and determine their susceptibility to petroleum development; identify sources and characterize them, including determination of the critical components of petroleum; quantify the transport mechanisms - concentrators, diffusers, and translators; quantify effects levels on individuals; relate the individual to his species and his species to the ecosystem, especially with intent to identify irreversible effects; develop and initiate a monitoring program based upon an understanding of the relations of biota to their physical environment; characterize the physical environment to provide data needed by licensing and regulatory agencies (Interior, Transportation) for judgment as to engineering design adequacy; provide timely input at all stages of BLM leasing and operations and provide timely assessment of alternatives; provide data format and storage such that data are easy to recover and amenable to analysis; and provide the best possible overall science while accomplishing the BLM mission. (See also W76-11474) (Sinha-OEIS)
W76-11478

ENVIRONMENTAL PROTECTION AGENCY'S ROLE, INTERESTS, AND RESPONSIBILITIES WITH RESPECT TO THE OUTER CONTINENTAL SHELF DEVELOPMENT,
Environmental Protection Agency, Johns Island, S. C. Office of Research and Development.
W. P. Davis.
In: Bureau of Land Management's Environmental Studies Program for the South Atlantic Outer Continental Shelf Area, Conference/Workshop Proceedings, Feb 1976. p 55-58.

Descriptors: *Continental Shelf, *Ecosystems, *Environmental effects, *Oil spills, Ecology, *Waste disposal, *Water quality control, *Resources development, Water resources, Land management, Management, Southeast U.S.
Identifiers: *Outer Continental Shelf, South Atlantic Coast, Georgia Bight, Georgia embayment, Environmental impact.

The U.S. Environmental Protection Agency's role with respect to OCS has been associated with efforts to develop a scientific basis for management decisions. Energy development and sound environmental interests need not be incompatible on the OCS issue. There are many ways in which EPA is directly or indirectly involved in the entire gamut of OCS operations in the broadest sense. EPA is concerned with ocean disposal; EPA performs an advisory role with respect to oil spills; the Narragansett Environmental Research Laboratory has the mission to supply scientific basis for establishment of marine water quality standards for petroleum; Gulf Breeze Environmental Research Laboratory has the mission to supply scientific basis for establishment of marine water quality standards for petroleum and in addition conducts work in the ecological effects of man-produced organic compounds in marine/estuarine ecosystems. Finally EPA has the responsibility to maintain one of the finest coastal areas of the United States. (See also W76-11474) (Sinha-OEIS)
W76-11479

OFFSHORE OPERATIONS, REGULATION AND ENVIRONMENTAL PROTECTION,
Exxon Co., New Orleans, La. Southeastern Div.
R. R. Hickman.
In: Bureau of Land Management's Environmental Studies Program for the South Atlantic Outer Continental Shelf Area, Conference/Workshop Proceedings, Feb 1976. p 63-68.

Descriptors: *Continental Shelf, *Environmental effects, *Resources development, *Oil industry, *Pollution abatement, Exploration, Operations, Drilling, Safety, Offshore platforms, Pipelines, Oil pollution.
Identifiers: *Outer Continental Shelf, Gas industry, Offshore technology.

In order to better understand the environmental impact of operations, the oil and gas industry has funded studies such as the recently completed 2-year Offshore Ecology Investigation. Undertaken by the prestigious Gulf Universities Research Consortium, with 23 principal scientists from 11 universities and two nonprofit research institutes participating, the study showed that there was no harm done in the 400 square nautical miles (1,370 sq. km) study area off Louisiana despite the fact that extensive operations there have been going for more than 25 years. Seasonal changes resulted in a significantly greater variability in all of the data than could be ascribed to the presence or absence of petroleum operations. Offshore petroleum operations are providing important energy supplies to the United States. In all phases of this activity, including exploration, field development, and production, environmental protection is a key consideration. Protective measures include personnel training, elaborate safety equipment, automatic controls, and back-up equipment. An overall good record of past performance offshore will be enhanced in the future by continuing technological improvement, by effective regulation, and by the industry's determination to protect the environment wherever it operates. (See also W76-11474) (Sinha-OEIS)
W76-11480

OVERVIEW OF CONFERENCE PROGRAMS,
Skidaway Inst. of Oceanography, Savannah, Ga.
D. Menzel.
In: Bureau of Land Management's Environmental Studies Program for the South Atlantic Outer Continental Shelf Area, Conference/Workshop Proceedings, Feb 1976. p 93-96.

Descriptors: *Continental shelf, *Environmental effects, *Ecosystems, *Resources development, *Oil industry, *Pollution abatement, *Baseline studies, Exploration, Drilling, Leases, Land management, Southeast U. S.
Identifiers: *Outer Continental Shelf, *Gas industry, Environmental impact.

The guidelines of the conference are as follows: To provide a summary of available related information and understanding for portions of the southeast Continental Shelf; to provide any predictions presently possible on the effects of drilling (exploration and development) on the environment in this area; to identify subject areas in which additional information is required for reasonable prediction and understanding of the environmental effects of drilling; and to formulate recommendations for baseline and monitoring programs which will help to determine adequately the environmental effects of oil and gas exploration and exploitation in the South Atlantic Outer Continental Shelf region. The BLM is specifically concerned with the potential impacts of activities on and around drilling platforms, including any effect such activities might have on the surrounding ocean or shoreline. (See also W76-11474) (Sinha - OEIS)
W76-11481

GEOLOGICAL OCEANOGRAPHY CONSIDERATIONS,
Duke University, Durham, N. C.
O. H. Pilkey.
In: Bureau of Land Management's Environmental Studies Program for the South Atlantic Outer Continental Shelf Area, Conference/Workshop Proceedings, Feb 1976. p 97-101.

Descriptors: *Continental Shelf, *Geology, *Sediments, *Sediment transport, *Environmental effects, *Resources development, *Seismic properties, Water resources, Beaches, Estuaries, Drilling, Engineering structures, Safety, Oil industry, Pollution abatement, Leases, Southeast U. S.
Identifiers: *Outer Continental Shelf, South Atlantic Coast, Georgia embayment, Georgia Bight, Blake Plateau.

A brief sketch of the geologic framework of the Southeastern U. S. Continental Shelf is presented and pertinent questions to be investigated in coordination with other baseline studies are given. The first question is: What is the origin of the present day sediment cover. The other questions are: What was the ultimate source of the sediment covering the Continental Shelf at the present time. What is being added to the sediment on the Continental Shelf at the present time. What is happening to the sand moving down rivers right now. Where does new sand come from for the beaches and the estuaries. How did the relict sand get onto the Continental Shelf. What happens to the mud coming down the rivers at the present time. How thick is the unconsolidated sediment cover on the Continental Shelf in this area. How much lateral or regional mixing of sand or materials occurs on the Continental Shelf. On a nonequilibrium shelf such as we have here (i.e., a shelf covered by relict sediments), what controls how grains move about locally. What is the role of the Gulf Stream. What is the role of storms in moving about suspended sediment and bottom sediment. How does material from the shelf or margin enter the deep sea, that is, get off the Continental Shelf and the Blake Plateau altogether. How about seismicity. What about the stability of manmade structures on the Continental Shelf; How much sampling has already been done here. And where do we stand in terms of our understanding of the geological framework. (See also W76-11474) (Sinha - OEIS)
W76-11482

PHYSICAL OCEANOGRAPHY CONSIDERATIONS,
State Univ. System of Florida Inst. of Oceanography, St. Petersburg.
M. Rinkel.
In: Bureau of Land Management's Environmental Studies Program for the South Atlantic Outer Continental Shelf Area, Conference/Workshop Proceedings, Feb 1976. p 103-105.

Descriptors: *Continental Shelf, *Resources development, *Oil industry, *Environmental effects, *Oil pollution, Pollution, Water pollution sources, Drilling, Offshore platforms.
Identifiers: *Outer Continental Shelf, *Physical oceanography, *Bottom transport, Georgia Bight, Georgia Embayment.

Exploration and development has potential for bringing contamination into the area. This contamination is in two forms; temporary contaminants from drilling operations and long-term contaminants from the rig itself or the material it drops on the bottom. Contaminants can enter the environment at the surface through water columns, but more importantly they probably enter at the bottom. Any data that can be used to predict or model where instantaneous spills or instantaneous and long-term contamination can occur become important. The problem is interdisciplinary in nature. Transport can be by organisms, by absorption, or by almost any phenomena that can pick up and move contaminants. It appears that there are not enough environmental data to provide a good handle on the environmental status in the area. If transport is considered to be the main problem, there are not enough data to develop good models or good prediction methods. Surface data from satellites and over-flights may be sufficient to generate a predictive ability for surface spills. The amount of bottom-current data is insignificant, and yet, if you examine the problems that we are facing, bottom transport may be the most important thing we are looking at. (See also W76-11474) (Sinha - OEIS)
W76-11483

BIOLOGICAL CONSIDERATIONS,
Duke Univ., Beaufort, N. C. Marine Lab.
R. T. Barber.
In: Bureau of Land Management's Environmental Studies Program for the South Atlantic Outer Continental Shelf Area, Conference/Workshop Proceedings, Feb 1976. p 109-112.

Descriptors: *Continental Shelf, Ecology, *Environmental effects, *Oil spills, Ecosystems, Water pollution, *Resources development, *Baseline studies, *Advection, Shellfish, Fisheries, *Estuaries, Circulation, Nutrients, Biology, Beaches, Southeast U. S.
Identifiers: *Outer Continental Shelf, *Environmental impact, *Bottom transport, *Gulf Stream, South Atlantic Coast, Georgia embayment.

The Outer Continental Shelf of the South Atlantic region is dominated by advection, that is, the major property in determining the chemical and biological character of the water column is the horizontal along-shelf and cross-shelf circulation. Intermittent intrusions of deep water from the Gulf Stream onto the shelf produce a shoreward bottom current, which is the principal source of nutrients for the shelf community. The research necessary for establishing the baseline ecosystem character and predicting the ecosystem response to modification must be built around this time-varying advective character. The present idea of how the stock of the calico scallop fishery is maintained is that the adults off North Carolina are recruited from larvae spawned off the coast of Florida and carried north. The advective larval transport system, which the proposed lease area sits astride and which connects the Floridian fauna to its further extensions off the coasts of Georgia, South Carolina, and North Carolina, is clearly the most vulnerable component of the ecosystem and the one most likely to be impacted by the proposed development. A spill or accident occurring in the absence of a Gulf Stream intrusion may be diluted and advected out of the system without detectable impact on the biota, while the same event occurring during a period of strong bottom flow across the shelf or during a period of strong onshore winds could product marked effects over a wide zone projecting from the spill site shoreward as far as the beach or estuary. (See also W76-11474) (Sinha-OEIS)
W76-11484

CONCLUSION AND RECOMMENDATIONS CONFERENCE/WORKSHOP,
Skidaway Inst. of Oceanography, Savannah, Ga.
D. Menzel.
In: Bureau of Land Management's Environmental Studies Program for the South Atlantic Outer Continental Shelf Area, Conference/Workshop Proceedings, Feb 1976. p 227-250.

Descriptors: *Continental Shelf, *Resources development, *Environmental effects, *Oil pollution, *Metals, *Ecosystems, *Water pollution effects, *Oil industry, Hazards, Geology, Biology, Oceanography, Meteorology, Safety, Leases, Conferences, Land management, Biota, Fisheries, Southeast U. S.
Identifiers: *Outer Continental Shelf, *Hydrocarbons, Georgia Embayment, South Atlantic Coast, Georgia Bight.

Conclusions and recommendations developed by the conference/workshop are summarized and discussed. There was a charge from the floor to establish study priorities based on possible impacts, which might exert a long-term effect on man or an irreversible effect on the environment. The following concerns were considered of major importance. (1) The possibility of accidents resulting from geological hazards; (2) Permanent destruction of unique environments; and (3) The effects of metals and hydrocarbons on organisms and the possible return of these elements/compounds to man. In keeping with the conclusions, it was determined that the recommendations developed in the individual workshops should be prioritized by considering the direct impact on man and the environment of any oil and gas development activities; weighting them according to the irreversibility of the impact; and assembling them into interdisciplinary packages. Within this general framework three priority groups were defined. Baseline, Direct Impact on Man: seismology and identification of faults and positions of aquifers, and test drillings to correlate with such a study; side-scan sonar mapping to identify hard bottom areas; inventory of metals and hydrocarbons in water, animals, and sediments; inventories of seasonal abundance of birds, mammals, and reptiles; inventories of benthic organisms in direct support of same locations; trajectories and net transport of water; management of background and historical data; coordination of activities associated with fish populations currently being conducted by Federal, State and private agencies; beach survey for tarballs; and chemistry of suspended particulates. Predictive Studies: fate of oil in marshes, shelf, and open ocean; and fate of metals in marshes, shelf, and open ocean. The third group contains all others. (See also W76-11474) (Sinha-OEIS)
W76-11485

AN ENVIRONMENTAL ASSESSMENT OF IMPACTS OF COAL DEVELOPMENT ON THE WATER RESOURCES OF THE YAMPA RIVER BASIN, COLORADO AND WYOMING--PHASE-II WORK PLAN,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 5C.
W76-11500

FEATURES OF FRESHWATER ECOSYSTEMS (FROM THE RESULTS OF SOVIET PARTICIPATION IN THE INTERNATIONAL BIOLOGICAL PROGRAM), (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institit.
For primary bibliographic entry see Field 5C.
W76-11556

A PRACTICAL DATA MANAGEMENT SYSTEM FOR MONITORING AND MANAGING LARGE DISTRIBUTED ECOSYSTEMS,
Michigan State Univ., East Lansing. Dept. of Electrical Engineering and Systems Science.
For primary bibliographic entry see Field 5G.
W76-11608

IMPACT OF WATER SUPPLY AND WASTEWATER ON THE COASTAL AND MARINE ENVIRONMENTS,
North Carolina State Univ., Raleigh. Sea Grant Program.
For primary bibliographic entry see Field 5D.
W76-11625

7. RESOURCES DATA

7A. Network Design

THE ENVIRONMENTAL INFORMATION SYSTEM (EIS) IN SWEDEN AND MONITORING OF THE ENVIRONMENT,
Swedish Council of Environmental Information, Stockholm. Jordbruksdepartementet.
For primary bibliographic entry see Field 5A.
W76-11241

THE NATIONAL STREAM QUALITY ACCOUNTING NETWORK,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 5A.
W76-11419

DECISION THEORY AND ITS APPLICATION TO NETWORK DESIGN,
Geological Survey, Reston, Va.
M. E. Moss.
In: Hydrological Network Design and Information Transfer; Proceedings of international seminar, held at Newcastle upon Tyne, U K, August 19-23, 1974: World Meteorological Organization Operational Hydrology Report No 8 (WMO No 433), p 23-25, 1976. 8 ref.

Descriptors: *Network design, *Data collections, *Statistical methods, *Decision making, Methodology, Regression analysis, Probability, Optimization.
Identifiers: *Bayes theorem, Subjective probabilities.

A brief description of the pros and cons of the use of classical statistics (non-Bayesian) in network design is presented. In classical statistics, the statistician is not concerned with the eventual decision that may be based on the results of an analysis. The classicist applies a rigorously derived formulation to an existing set or sets of data and might state something to the effect that at the 95 percent confidence level there is no difference between the means from which two samples were drawn, or he might state that there is a probability of 99 percent that the true mean from which a sample was drawn lies between two particular values. The classicist can specify the types of tests used in his analysis and provide another statistician with his data and the two will obtain exactly the same results. Thus classical statistics is both rigorous and reproducible and, if it is used to formulate network design strategies, each designer would arrive at the same network if all used the same data. On the other hand, if classical statistics are used in network design, the ultimate goal of providing optimum levels of information is in all likelihood not reached because the uses to which the data will be put are not incorporated into the procedure. Surrogate measures such as conficence bands or accuracy statements become the parameters of the design criteria. (Woodard-USGS)
W76-11498

INFORMATION TRANSFER FOR STREAM DISCHARGE,
Geological Survey, Reston, Va.
M. E. Moss.
In: Hydrological Network Design and Information Transfer; Proceedings of international seminar, held at Newcastle upon Tyne, U K, August 19-23, 1974: World Meteorological Organization Operational Hydrology Report No 8 (WMO No 433), p 119-128, 1976. 2 fig, 3 tab, 7 ref.

Descriptors: *Network design, *Flow characteristics, *Gaging stations, *Regression analysis, Estimating streamflow, Sites, Probability, Optimization, Computer programs.
Identifiers: *Ungaged stream sites.

The need for mechanisms by which information pertaining to streamflow can be transferred from one or more sites to sites at which little or no data are available becomes obvious if it is technically impossible to perfectly anticipate demands for streamflow information, and economically impossible to gauge at every conceivable site. Network design by the use of regression-analysis simulation is thus a viable tool that can be considered in the expansion of existing streamflow-data networks. At present, however, the method cannot be applied in areas where existing data are not sufficient to perform an initial regression analysis because of lack of knowledge concerning the underlying model errors contained in the regression. Plans are under way to remedy this by posterior analysis of the results obtained using the method in the United States and elsewhere in the world. An additional limitation may arise when the existing catalogue does not cover the range of parameters required for the system under examination. Under such a circumstance computer programs can be made available for the extension of the catalogue. These extended results can be added to existing catalogues so as to minimize the likelihood that future users will encounter such limitations. (Woodard-USGS)
W76-11499

7B. Data Acquisition

VEGETATION MAPPING IN LAKE CHAMPLAIN WETLANDS,
Vermont Univ., Burlington. Dept. of Geography.
For primary bibliographic entry see Field 4A.
W76-11111

COMPARISON OF METHODS FOR ESTIMATING POTENTIAL EVAPOTRANSPIRATION IN THE NORTH PLATTE BASIN OF WYOMING,
Wyoming Univ., Laramie. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2D.
W76-11115

DESIGN OF POLLUTANT ORIENTED INTEGRATED MONITORING SYSTEMS,
Environmental Protection Agency, Las Vegas, Nev.
E. A. Schuck, and G. B. Morgan.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nevada, p 20-6-1 - 20-6-6. 8 fig, 11 ref.

Descriptors: *Monitoring, *Systems analysis, *Water pollution effects, *Lead, *Flow, *Water pollution sources, Path of pollutants, Runoff, Analytical techniques, Evaluation.

The use of an integrated monitoring systems approach for assessing the sources and environmental impact of specific pollutants is discussed. The integrated monitoring systems approach simultaneously takes into account the critical receptors, critical transport pathways, and critical sources. The use of the integrated monitoring systems approach for illustrating the flow of lead from sources through various environmental pathways and its interaction with a critical receptor (an urban child under 6 years of age) revealed that lead from drinking water sources represents a minor contribution to exposure, except in small isolated areas, since most of the particulate lead in the environment is largely in an insoluble form. A flow diagram of the fate of lead contributed from an automotive fleet reveals that street runoff into coastal waters accounts for only about 2% of the total lead emitted. The application of the integrated concept to the test case demonstrated the inability of conventional chemical and physical methods for monitoring total exposure of a critical receptor. (See also W76-10637) (Kreager-FIRL)
W76-11238

THE MEANING AND MEASUREMENT OF TURBIDITY,
National Oceanographic Instrumentation Center, Washington, D.C.
For primary bibliographic entry see Field 5A.
W76-11240

GREAT LAKES TEMPERATURE MAPS BY SATELLITE,
National Environmental Satellite Service, Washington, D. C.
For primary bibliographic entry see Field 2H.
W76-11300

SELECTED SATELLITE DATA ON SNOW AND ICE IN THE GREAT LAKES BASIN 1972-73,
National Environmental Satellite Service, Washington, D. C.
For primary bibliographic entry see Field 2C.
W76-11301

PROGRAMMABLE CALCULATORS: MODERN INSTRUMENTS FOR ANALYZING HYDROLOGIC DATA,
Geological Survey, Tallahassee, Fla.
D. V. Maddy.
Open-file report 75-642, December 1975. 24 p, 15 fig, 2 ref.

Descriptors: *Data processing, *Data collections, *Hydrologic data, *Data transmission, *Systems analysis, Surface water, Groundwater, Hydrology, Data storage and retrieval, Instrumentation, Telemetry.
Identifiers: *Programmable calculators.

The programmable calculator has become a valuable addition to the set of modern instruments that a hydrologist has at his disposal for the analysis of hydrologic data. The programmable calculator may be used to compute discharge measurements, to compute daily discharges from gage heights and shifts, to compute duration values, to compute discharge of flow through a venturi constriction, to compute values of production and respiration for oxygen metabolism studies, and to perform many other data analysis tasks. The programmable calculator can store and retrieve various kinds of data, can prepare summary tables of ground-water and surface-water elevations, and can plot graphs of various parameters. The programmable calculator's versatility is almost unlimited and allows data handling on a current basis. (Woodard-USGS)
W76-11416

WATER CURRENT FORCE MEASURING APPARATUS,
S. J. Niskin.
U. S. Patent No. 3,955,412, 3 p, 4 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 946, No 2, p 497, May 11, 1976.

Descriptors: *Patents, *Currents(Water), *Water circulation, *Water level fluctuations, Ocean currents, Current meters, Tidal effects, Cycles, Strain gages, Strain measurement, Instrumentation, Energy, Kinetics.

A water current force measuring apparatus consists of a pliable rope or line suspended in the water with its lower end anchored to the bottom while the length of the line is subjected to the forces of the current. The upper end of the line is secured to a tensiometer or strain gauge, which in turn is connected to a float or a series of interconnected buoys or floats. Those floats that submerge, balance the total horizontal current-generated force or drag on the line, which is recorded on the tensiometer. These readings are a measure of the total current forces acting on the line by the surface and subsurface currents to permit the ready determination of the total kinetic energy of the currents. Upon obtaining continuous readings of the strain gauge over a definite period, wave heights and lenghts,as well as tidal and other cyclic and non-cyclic water movements of the body of water can be ascertained. (Sinha - OEIS)
W76-11444

GEOPHYSICAL PROSPECTING FOR GROUND WATER IN ALASKA,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4B.
W76-11496

THE POTENTIAL IMPACT OF SATELLITE DATA-RELAY SYSTEMS ON THE OPERATION OF HYDROLOGIC DATA PROGRAMS,
Geological Survey, Reston, Va. ; and Geological Survey, Bay Saint Louis, Miss.
D. W. Moody, and D. M. Preble.
In: Water for Human Needs; Proceedings of the Second World Congress on Water Resources, Volume V, held in New Delhi, India, December 12-16, 1975: Published by C.V.J. Varma, Indian Committee for International Water Resources Association, p 261-273, 7 fig, 2 tab, 17 ref.

Descriptors: *Network design, *Satellite(Artificial), *Telemetry, *Hydrologic data, *Planning, Evaluation, On-site investigation, Costs, Data collections, Monitoring, Methodology.
Identifiers: *Satellite data-relay systems.

A review is presented of the operation of a non-telemetered hydrologic data collection system and identifies work elements which will be affected by telemetry. Estimated costs and the performance of non-telemetered stations are compared with those of stations telemetered via land-line, line-of-sight radio, meteor burst, and satellite communication links. It is concluded that the total costs of a large network of automatic hydrologic data collection stations, whose data are transmitted via satellite to a central station, are comparable to the total costs of a non-telemetered network. Because of their extensive geographic coverage, satellite systems will play an important part on the design and operation of future water resource management systems and global environmental monitoring programs. (Woodard-USGS)
W76-11497

A SIMPLE AND RAPID METHOD OF SOIL WATER DETERMINATION,
Himachal Pradesh Univ., Palampur (India). Coll. of Agriculture.
For primary bibliographic entry see Field 2D.
W76-11506

7C. Evaluation, Processing and Publication

THE ENVIRONMENTAL INFORMATION SYSTEM (EIS) IN SWEDEN AND MONITORING OF THE ENVIRONMENT,
Swedish Council of Environmental Information, Stockholm. Jordbruksdepartementet.
For primary bibliographic entry see Field 5A.
W76-11241

ENVIRONMENTAL INDICES AND MONITORING,
Department of the Environment, Ottawa (Ontario). Science Policy Branch.
For primary bibliographic entry see Field 5A.
W76-11245

TOWARDS A COMPUTER-BASED INFORMATION MONITORING SYSTEM FOR GROUNDWATER DATA IN NEW ZEALAND,
Illinois Univ. at Chicago Circle. Dept. of Geological Sciences.
For primary bibliographic entry see Field 4B.
W76-11247

METROPOLITAN TORONTO'S APPROACH TO PREVENTATIVE MAINTENANCE FOR TREATMENT PLANTS,
Metropolitan Toronto Dept. of Works, (Ontario). Water and Pollution Control Directorate.
For primary bibliographic entry see Field 5F.
W76-11255

GREAT LAKES TEMPERATURE MAPS BY SATELLITE,
National Environmental Satellite Service, Washington, D. C.
For primary bibliographic entry see Field 2H.
W76-11300

COMPUTER PROGRAM FOR THREE-DIMENSIONAL PLOTTINGS FROM IRREGULAR FINITE ELEMENT GRID,
California Univ., Davis. Dept. of Land, Air and Water Resources.
For primary bibliographic entry see Field 2F.
W76-11327

FLOOD PLAIN INFORMATION: KASKASKIA RIVER, BEAR CREEK, LAKE FORK CREEK, WEST FORK CREEK AND 'A' CREEK, DOUGLAS COUNTY, ILLINOIS, NO. 1.
Army Engineer District, St. Louis, Mo.
For primary bibliographic entry see Field 4A.
W76-11341

FLOOD PLAIN INFORMATION: LAKE MONROE, NEAR SANFORD, FLORIDA.
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 4A.
W76-11342

FLOOD PLAIN INFORMATION: NORTHEAST VOLUSIA COUNTY, FLORIDA.
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 4A.
W76-11343

FLOOD PLAIN INFORMATION: SWIFT CREEK, MACON AND BIBB COUNTY, GEORGIA.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 4A.
W76-11344

FLOOD PLAIN INFORMATION: WAYCROSS DRAINAGE CANAL, WAYCROSS AND WARE COUNTY, GEORGIA.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 4A.
W76-11345

FLOOD PLAIN INFORMATION: BUCK CREEK AND GRASSY CREEK, MARION COUNTY, INDIANA,
Army Engineer District, Louiville, Ky.
For primary bibliographic entry see Field 4A.
W76-11346

FLOOD PLAIN INFORMATION: KENAI RIVER, PHASE II, KENAI PENINSULA BOROUGH, ALASKA,
Army Engineer District, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W76-11347

FLOOD PLAIN INFORMATION: FISHER CREEK, SANTA CLARA COUNTY, CALIFORNIA,
Army Engineer District, San Francisco, Calif.
For primary bibliographic entry see Field 4A.
W76-11348

FLOOD PLAIN INFORMATION: ALAMITOS CREEK, INCLUDING GUADALUPE CREEK-ARROYO CALERO AND SANTA TERESA CREEK, SANTA CLARA COUNTY, CALIFORNIA,
Army Engineer District, San Francisco, Calif.
For primary bibliographic entry see Field 4A.
W76-11349

FLOOD PLAIN INFORMATION: DEER CREEK AND WHITE RIVER, EARLIMART, CALIFORNIA,
Army Engineer District, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W76-11350

FLOOD PLAIN INFORMATION: GREEN VALLEY, DAN WILSON, AND SUISUN CREEKS, CORDELIA, CALIFORNIA.
Army Engineer District, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W76-11351

FLOOD PLAIN INFORMATION: CACHE LA POUDRE RIVER, COLORADO, VOL. III. FORT COLLINS-GREELEY-LARIMER-WELD COUNTY.
Army Engineer District, Omaha, Nebr.
For primary bibliographic entry see Field 4A.
W76-11352

FLOOD PLAIN INFORMATION: WABASH RIVER, MIAMI COUNTY AND PERU, INDIANA.
Army Engineer District, Louisville, Ky.
For primary bibliographic entry see Field 4A.
W76-11353

FLOOD PLAIN INFORMATION: POGUES RUN, PLEASANT RUN, AND BEAN CREEK, MARION COUNTY, INDIANA.
Army Engineer District, Louisville, Ky.
For primary bibliographic entry see Field 4A.
W76-11354

FLOOD PLAIN INFORMATION: LICK CREEK AND LITTLE BUCK CREEK, MARION COUNTY, INDIANA.
Army Engineer District, Louisville, Ky.
For primary bibliographic entry see Field 4A.
W76-11355

FLOOD PLAIN INFORMATION: LITTLE ARKANSAS RIVER AND SAND CREEK, SEDGWICK, KANSAS.
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W76-11356

FLOOD PLAIN INFORMATION: BIG SANDY RIVER, BOYD COUNTY, KENTUCKY.
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 4A.
W76-11357

FLOOD PLAIN INFORMATION: QUINEBAUG RIVER - CADY BROOK, TOWN OF SOUTHBRIDGE, MASSACHUSETTS.
Army Engineer District, Waltham, Mass.
For primary bibliographic entry see Field 4A.
W76-11358

FLOOD PLAIN INFORMATION: MERRIMACK RIVER, CITY OF CONCORD, NEW HAMPSHIRE.
Army Engineer District, Waltham, Mass.
For primary bibliographic entry see Field 4A.
W76-11359

FLOOD PLAIN INFORMATION: ALUM CREEK, VICINITY OF COLUMBUS, OHIO.
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 4A.
W76-11360

FLOOD PLAIN INFORMATION: SOUTH FORK RIVANNA RIVER, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W76-11361

SOURCES OF WATER QUALITY, LAKE LEVEL, ICE, WATER TEMPERATURE, AND METEOROLOGICAL DATA FOR THE ST. LAWRENCE GREAT LAKES,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
A. M. Beeton, and J. W. Strand.
University of Wisconsin-Milwaukee (Wisconsin), Advisory Report No. 10, 193 p, January, 1975. 5 fig, 8 ref, 5 tab.

Descriptors: *Great Lakes, *Hydrologic data, *Meteorological data, Stations, *Data collections, *Water quality, Canada, United States, Weather data, On-site data collections, Intakes, Water chemistry, Lake Superior, Lake Michigan, Lake Ontario, Lake Huron, Lake Erie, Weather data, Chemical properties, Physical properties, Biological properties, Sampling.

This 2-part report lists data sources around the Great Lakes (in both Canada and the United States) collecting hydrographic and meteorological data. Data sources for hydograghic information are municipal, industrial, power plant, and military water treatment plants. The hydrographic section identifies the data source (along with address, telephone number, and person to contact), gives information on the physical structure of the water intake, indicates what specific chemical, physical, biological, and radiological measurements are made on the raw (untreated) water, shows the period of record, and the availability of the data. The meterological section lists weather stations around the Great Lakes up to a distance of 125 miles inland and their location (latitude and longitude) and elevation, agency to contact when requesting data, period of record, and type of data collected (e.g., air temperature, relative humidity, precipitation, solar radiation). (Witt-IPC)
W76-11363

STATISTICAL SUMMARIES OF INDIANA STREAMFLOW DATA,
Geological Survey, Indianapolis, Ind.
R. G. Horner.
Water-Resources Investigations 35-75, February 1976. 526 p, 1 fig, 2 tab, 13 ref.

Descriptors: *Streamflow, *Basic data collections, *Hydrologic data, *Indiana, *Gaging stations, Discharge(Water), Flow rates, Flow characteristics, High flow, Low flow, Average flow, Peak discharge, Annual, Monthly.

Complete statistical streamflow analyses are presented in tabular form for all gaging stations in Indiana, regardless of length of record. Each station analysis includes lowest and highest mean daily discharges, flow duration, and annual peak discharges. Statistics also are given on normal monthly means, normal annual means, log monthly means, and log annual means. (Woodard-USGS)
W76-11409

GROUND-WATER RECORDS FOR NORTHEASTERN OKLAHOMA: PART 1--RECORDS OF WELLS, TEST-HOLES, AND SPRINGS,
Geological Survey, Oklahoma City, Okla.
J. S. Havens, and D. L. Bergman.
Open-file report, March 1976. 100 p, 33 ref.

Descriptors: *Groundwater, *Basic data collection, *Water wells, *Well data, Test wells, Springs, Aquifers, Water yield, Water levels, Water utilization, Bibliographies, Publications, *Oklahoma.
Identifiers: Northeastern Oklahoma.

The U. S. Geological Survey has collected data on Oklahoma's ground-water resources since 1934. Most of these data were collected as part of specific ground-water studies conducted in cooperation with various Federal, State, and local agencies. This report includes published and unpublished records of approximately 3,360 wells, test-holes, and springs for 23 counties in northeastern Oklahoma. In addition, selected references to pertinent ground-water reports covering parts of the 23-county area are presented. (Woodard-USGS)
W76-11412

HYDROLOGIC DATA FOR URBAN STUDIES IN THE SAN ANTONIO, TEXAS METROPOLITAN AREA, 1974,
Geological Survey, Austin, Tex.
V. Gonzalez.
Open-file report, May 1976. 109 p, 1 fig, 5 tab.

Descriptors: *Storms, *Rainfall-runoff relationships, *Water quality, *Small watersheds, *Urban runoff, Texas, Hydrologic data, Streamflow, Rain gages, Gaging stations, Peak discharge, Path of pollutants, Chemical analysis, Hydrographs, Mass curves.
Identifiers: *San Antonio(Tex).

Runoff data from the San Antonio urban study area for the 1974 water year are based on discharge measurements and stage records at six continuous-record stream-gaging stations, seven crest-stage partial-record stations (flood hydrographs obtained), and water-surface elevations at eleven flood-profile partial-record stations. Storms producing the highest peak discharges in the San Antonio metropolitan area occurred on the following days: Oct. 11, 1973, and Aug. 8, 30, 1974. Weighted rainfall for these storm periods upstream from continuous-record gaging stations and selected crest-stage partial-record stations are given. Water-quality data have been collected from watersheds in various stages of urban development at most of the gaging stations in the San Antonio urban area. This water-quality program provides data on the concentration of pollutants as a result of runoff from these watersheds. In addition these data provide a relationship of water-quality parameters to discharge and seasonal conditions. (Woodard-USGS)
W76-11413

HYDROLOGIC RECORDS FOR LAKE COUNTY, FLORIDA, 1973-74,
Geological Survey, Tallahassee, Fla.
C. P. Laughlin, and D. M. Hughes.
Open-file report FL 75013, 1975. 72 p, 37 fig, 22 tab, 7 ref.

Descriptors: Water resources, *Basic data collections, *Surface waters, *Groundwater, *Water quality, Streamflow, Hydrogeology, Aquifer characteristics, Water wells, Water levels, Hydrologic data, Lakes, Chemical analysis, *Florida.
Identifiers: Lake County(Fla).

A hydrologic records program was begun in 1969 by the U. S. Geological Survey in cooperation with the Lake County (Florida) Board of County Commissioners, and the Oklawaha Basic Recreation and Water Conservation and Control Authority. This is the fifth annual report for the hydrologic records program; it presents and summarizes the data for 1973-74 in both tabular and graphic form. Included are stream discharge records for two water years plus a three month period (October 1, 1972 to December 1974) and groundwater and lake levels, and water quality data for May 1973 through December 1974. Also included are water levels in approximately 60 wells measured each May to obtain data for annual preparation of maps of the potentiometric surface of the Florida aquifer. A map of the potentiometric surface of the Floridan aquifer in the Leesburg area on May 17, 1974 is presented. Additional hydrologic data are included from cooperative programs between the U. S. Geological Survey and the Southwest Florida Water Management District, and the Florida Department of Natural Resources. (Woodard-USGS)
W76-11414

PROGRAMMABLE CALCULATORS: MODERN INSTRUMENTS FOR ANALYZING HYDROLOGIC DATA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7B.
W76-11416

THE NATIONAL STREAM QUALITY ACCOUNTING NETWORK,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 5A.
W76-11419

OBJECTIVE ANALYSIS OF IFYGL SURFACE METEOROLOGICAL DATA,
National Oceanic and Atmospheric Administration, Washington, D. C.
For primary bibliographic entry see Field 2H.
W76-11435

THE ATMOSPHERIC BUDGETS PROGRAM OF IFYGL,
National Oceanic and Atmospheric Administration, Washington, D. C. Environmental Data Service.
For primary bibliographic entry see Field 2H.
W76-11436

DOCUMENTATION FOR ES001. A STEADY-STATE, ONE DIMENSIONAL, ESTUARINE WATER QUALITY MODEL,
Environmental Protection Agency, New York. Region II.
For primary bibliographic entry see Field 5B.
W76-11460

WICHITA FALLS INTEGRATED MUNICIPAL INFORMATION SYSTEM, WATER UTILITY PROCESSING SYSTEM (WUPS), APPLICATION COMPLETION REPORT, VOLUME I.
For primary bibliographic entry see Field 3D.
W76-11596

WICHITA FALLS INTEGRATED MUNICIPAL INFORMATION SYSTEM, WATER UTILITY PROCESSING SYSTEM (WUPS), APPLICATION COMPLETION REPORT, VOLUME II.
For primary bibliographic entry see Field 3D.
W76-11597

MODELING SOLUTE TRANSPORT IN GROUND WATER,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 5B.
W76-11605

AN IMPROVED MODEL FOR ANALYSIS OF AIR AND WATER POLLUTION DATA,
Environmental Protection Agency, Las Vegas, Nev. Office of Research and Development.
For primary bibliographic entry see Field 5B.
W76-11606

DATA MANAGEMENT: KEY TO ENVIRONMENTAL QUALITY ASSESSMENT,
National Oceanic and Atmospheric Administration, Washington, D. C. Environmental Data Service.
For primary bibliographic entry see Field 5G.

W76-11607

THE ROLE OF ENVIRONMENTAL DATA BANKS IN ENERGY RESOURCE DEVELOPMENT,
Kentucky Univ., Lexington. Inst. for Mining and Minerals Research.
For primary bibliographic entry see Field 5G.
W76-11609

SAMPLE TRACKING DATA MANAGEMENT SYSTEM,
Environmental Monitoring and Support Lab., Las Vegas, Nev.
R. N. Snelling, M. J. Madsen, and G. C. Allison.
In: International Conference on Environmental Sensing and Assessment, Vol. 2, September 14-19, 1975, Las Vegas, Nev., p 31-3-1-31-3-4. 3 fig, 1 tab.

Descriptors: *Quality control, *Computer programs, *Data collections, *Tracking techniques, Analytical techniques, Data processing, Data storage and retrieval.

A system for tracking laboratory samples of water or other materials through their respective analyses to completion is described. The system, which is known as the Sample Tracking Data Management System, provides for the storage and retrieval of data from a direct access master file. On the input side, sample identification and collection data are entered through the use of a sample header information card and a location description information card. The system allows for the interfacing of laboratory analytical programs directly with the master file for the purpose of retrieving needed sample collection information. Analytical result cards are generated for direct reentry into the data management system. On the output side of the system, data summaries may be generated directly from the master file. Working files may also be created for utilizing special purpose application programs such as dose models, plotting, contouring, and statistical analysis. The sample tracking module of the system provides a tool to management for evaluating and controlling the laboratory operations function by providing sample status information. (See also W76-10637) (Kreager-FIRL)
W76-11611

QUALITY CONTROL AND HARMONIZATION PROGRAMMES FOR THE ASSESSMENT OF EFFECTS AND THE MEASUREMENT OF ENVIRONMENTAL POLLUTION IN THE EUROPEAN COMMUNITIES,
Commission of the European Communities, Luxembourg. Health Protection Directorate.
For primary bibliographic entry see Field 5G.
W76-11613

VALIDATION OF ENVIRONMENTAL MEASUREMENT METHODOLOGY,
Environmental Monitoring and Support Lab., Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W76-11614

8. ENGINEERING WORKS

8B. Hydraulics

OPTIMIZATION OF WATER DISTRIBUTION NETWORK SYSTEMS,
Weston (Roy F.), Inc., West Chester, Pa.
A. K. Deb.
Journal of the Environmental Engineering Division, Proceedings of the American Society of Civil Engineers, Vol. 102, No. EE4, Proceedings paper 12343, p 837-851, August 1976. 8 fig, 30 equ, 12 ref.

Descriptors: *Water distribution(Applied), *Pipes, *Networks, *Optimization, *Costs, *Hazen-Williams equation, *Environmental engineering, Design, Pipe flow, Economics, Hydraulics, Computer programs, Systems analysis.
Identifiers: Cost minimization.

A new method for a workable optimum cost solution of pipe sizes of various branches of a water distribution network with given geometry, peak demand values, and specified terminal pressure heads has been developed incorporating pipe cost function. A correction factor for flow has also been derived which, when algebraically added successively to the assumed flow values of pipes in a loop during an iteration process, results in convergence towards the solution. As theoretical least-cost solution results in the formation of a tree network, a workable optimum condition has been considered by fixing a minimum size of pipes. The integrated total cost of the system including capital and recurring cost of pumping station, elevated reservoir, and pipes has been optimized to obtain optimum inlet pressure head, pressure surface, and position of elevated reservoir for a given network. The applicability of the approach, which utilizes the Hazen-Williams equation, is illustrated with a problem. The effect of the density of population on the cost has been studied and a general computer program developed. (Bell-Cornell)
W76-11133

GROYNE STABILIZATION OF SLOPE MOVEMENTS AND TOE EROSION, LAKE HURON NEAR BAYFIELD, ONTARIO,
University of Western Ontario, London. Dept. of Civil Engineering.
R. M. Quigley, J. H. L. Palmer, A. Rowland, and D. Bere.
In: Proceedings, Seventeenth Conference on Great Lakes Research, Part 1; McMaster University, Hamilton (Ontario), August 12-14, 1974. International Association for Great Lakes Research, p 193-206, 1974. 9 fig, 12 ref.

Descriptors: *Groins(Structures), *Gabions, *Shore protection, *Lake Huron, Structures, Hydraulic structures, Jetties, Beaches, Beach erosion, Berms, Erosion, Erosion control, Waves(Water), Coasts, Coastal structures, Shores, Engineering.
Identifiers: *Bayfield(Ontario).

The storm of March 17, 1973 caused very severe erosion at many places along the east coast of Lake Huron. Subsequent spring wave action continued to attack the toe of many 17 m high cliffs resulting in numerous landslides, many of them encroaching on valuable cottage properties. This paper described the layout, installation, and first year performance of a system of three gabion groynes set up to protect a 122 m long section of coast already subject to severe earth movements. In the absence of adequate design information, the design was based on preliminary wind data and field observations of beach characteristics, sand availability and probable wave heights. The groynes, which were constructed during June and July 1973, were spaced about 36 m apart and extended off-shore from the cliff toe for a distance of about 18 m. The ends of the groynes, therefore, extend to the plunge point of 1.2 m high waves generated by strong trade winds and about 60% of the distance to the estimated location of the plunge point of severe storms. The beach height at the cliff toe has built itself up to 1.8 m above present water levels and provides a beach berm just adequate to stabilize the lower portions of the failing cliff behind it during the wet spring conditions of 1974. The installation has been very successful, the groynes having rapidly filled with sand and gravel. The groyne field and resultant beach prevented spring time erosion during the period from March to May 1974 and is presently considered to be performing successfully. (See also W76-11275) (Sims - ISWS)
W76-11290

HELMHOLTZ RESONANCE IN HARBOURS OF THE GREAT LAKES,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2H.
W76-11306

FIELD OBSERVATIONS OF THE DYNAMICS OF HEATED DISCHARGE JETS,
Argonne National Lab., Ill. Energy and Environmental Systems Div.
For primary bibliographic entry see Field 5B.
W76-11307

A NUMERICAL MODEL FOR THERMAL PLUMES AND RIVER DISCHARGES,
Case Western Reserve Univ. Cleveland, Ohio. Dept. of Earth Sciences.
For primary bibliographic entry see Field 5B.
W76-11310

BENEATH THE TENN-TOM,
Geological Survey, Nashville, Tenn.
For primary bibliographic entry see Field 4A.
W76-11415

TRANSVERSE DISPERSION IN PARTIALLY STRATIFIED TIDAL FLOW,
California Univ., Berkeley. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W76-11486

HYDRAULIC MODEL STUDIES OF MECHANICAL MIXING DEVICES IN STRATIFIED LAKES,
Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.
P. M. Moretti, and D. K. McLaughlin.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-256 709, $5.50 in paper copy, $3.00 in microfiche. Oklahoma Water Resources Research Institute, Stillwater, Completion Report (ER 76-ME-2), (1976). 98 p, 22 fig, 3 tab, 23 ref, 8 append. OWRT A-064-OKLA (1).

Descriptors: *Destratification, Lakes, *Hydraulic models, *Mixing, *Design criteria, Model studies, Jets, Density stratification, *Stratification, Oklahoma.
Identifiers: *Mechanical mixing, Ham's Lake(Okla).

The investigation was undertaken to analyze the effectiveness of devices for artificially destratifying lakes. A criterion for the effectiveness of mixing was selected. This criterion was applied to a number of variations of mechanical mixing devices, to indicate trends in optimization of designs. Experiments were performed in a vertically exaggerated scale model of Ham's Lake. Destratification was accomplished by a jet of water from two different sizes of propellers in different configurations (shrouded, skirted, and free; at two depths; and with a deflector) mixing the top water with the bottom water. Data taken from the experiments include density profiles as a function of time. The data were analysed determining the change of the stability index with time.
W76-11495

SCOUR AND FILL PATTERNS IN POOL-RAPID RIVERS,
Arizona Univ., Tucson. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 2J.
W76-11511

8C. Hydraulic Machinery

INTERNATIONAL ASSOCIATION OF DRILLING CONTRACTORS DRILLING MANUAL,
International Association of Drilling Contractors, Houston, Tex. Rotary Drilling Committee.
International Association of Drilling Contractors, Ninth edition, 320 p., June, 1974.

Descriptors: *Drilling equipment, *Drilling, *Boreholes, *Wells, *Boring, *Rotary drilling, Core drilling, Borehole geophysics, Casing, Drilling fluids, Cement grouting, Training.
Identifiers: Drilling procedures, Drilling equipment specifications, Drilling equipment handling, Drilling equipment maintenance.

A manual of drilling equipment contains drilling system component specifications, recommended care, maintenance, and handling procedures. Detailed examples are given at the end of most chapters. A glossary of drilling terms contains the nomenclature of equipment and procedures. Some of the equipment listed are: bits, tool joints, drill pipe, casing, tubing, drill collars, kelly bars, pipe handling equipment, brakes, chains and sprockets, rotary hose, swivels, pumps, blow out prevention equipment, derricks and masts. Trouble shooting methods in the areas of hole deviation and stuck drill pipe are also explained. (Heiss-NWWA)
W76-11102

COST OPTIMIZATION OF RURAL WATER SYSTEMS,
Iowa State Univ., Ames. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6C.
W76-11167

METROPOLITAN TORONTO'S APPROACH TO PREVENTATIVE MAINTENANCE FOR TREATMENT PLANTS,
Metropolitan Toronto Dept. of Works, (Ontario). Water and Pollution Control Directorate.
For primary bibliographic entry see Field 5F.
W76-11255

8D. Soil Mechanics

GROYNE STABILIZATION OF SLOPE MOVEMENTS AND TOE EROSION, LAKE HURON NEAR BAYFIELD, ONTARIO,
University of Western Ontario, London. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W76-11290

8F. Concrete

INTERNATIONAL ASSOCIATION OF DRILLING CONTRACTORS DRILLING MANUAL,
International Association of Drilling Contractors, Houston, Tex. Rotary Drilling Committee.
For primary bibliographic entry see Field 8C.
W76-11102

USING PAPER MILL SLUDGE AS CONCRETE ADMIXTURE,
Michigan Technological Univ. Houghton.
For primary bibliographic entry see Field 5E.
W76-11399

8G. Materials

INTERNATIONAL ASSOCIATION OF DRILLING CONTRACTORS DRILLING MANUAL,
International Association of Drilling Contractors, Houston, Tex. Rotary Drilling Committee.
For primary bibliographic entry see Field 8C.
W76-11102

SMOKE TEST SEWERS TO FERRET OUT ILLEGAL INFLOW,
W. S. Foster.
American City and County, Vol. 91, No. 6, p 44, June, 1976.

Descriptors: *Sewers, *Surface waters, *Smoke, *Inflow, Analytical techniques, *Infiltration, Pipelines, Measurement, Manholes, Tests, Testing procedures.
Identifiers: Smoke tests.

The use of smoke tests to identify pathways for the infiltration and inflow of unwanted surface water into public sewer systems is discussed. Smoke tests can be performed on a single line of sewers connected by two manholes or two lines connected by three manholes if the total run is not excessive. In the former case, the smoke is injected through either manhole; in the latter case, it is introduced through the center manhole. In either case the line or lines must be blocked to confine the smoke. The smoke can be produced either by candles or bombs that generate zinc chloride mist or by dioctylphthalate aerosol. A small portable blower like the type many municipal maintenance crews customarily use is sufficient for introducing the smoke into the manhole. If smoke rises from downspouts or outside drain, this indicates illegal connections with the sewerage system. Smoke appearing at the ground surface indicates a break in the pipeline. (Kreager-FIRL)
W76-11211

REVIEW OF STANDARDS AND OTHER INFORMATION ON THERMOPLASTIC PIPING IN RESIDENTIAL PLUMBING,
National Bureau of Standards. Washington, D. C.
R. S. Wyly, W. J. Parker, D. E. Rorrer, J. R. Shaver, and G. C. Sherlin.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-75-10769, $4.50 in paper copy, $3.00 in microfiche. Building Science Series No. 68, May, 1975. 65 p, 1 fig, 10 tab, 56 ref, append.

Descriptors: *Plastic pipes, *Drains, *Plumbing, *Water conveyance, *Plastics, Performance, Burning, Heat resistance, Thermal properties, *Reviews.

Existing information on the physical characteristics of thermoplastic piping of particular interest for its use in residential, above-ground plumbing are reviewed. Adequacy of functional performance of plumbing systems is considered from the user's viewpoint. Thin-wall poly(vinyl chloride) (PVC) drain-waste-vent systems and tube-size chlorinated poly(vinyl chloride) (CPVC) water-distribution piping in particular were studied. Acrylonitrile-butadiene-styrene (ABS) is also widely used for water distribution and drain, waste, and vent systems (DWV). The principal issues involving thermoplastics piping for above-ground plumbing include potential fire hazards, effects of hot water, potential for chemically induced cracking, effects of hydrostatic pressure and water hammer, adequacy of acoustical performance, and ability to assure critical design and installation details through routine inspection. Where thermoplastics piping is approved, there are often restrictions, including type of waste, fire rating of the building, pipe wall thickness, and height. Performance of ABS and PVC drain-waste-vent piping apparently depends to a significant degree on installation and design details. (Snyder-FIRL)
W76-11603

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

COLLECTED REPRINTS, VOLUME III: 1971-1974,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 06B.
W76-11103

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Dieldrin and DDT: Accumulation from Water and Food by Lake Trout (Salvelinus Namaycush) in the Laboratory,
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Annual Report - VTE/MSF Module - Fountain Valley Test Facility, July 1, 1975 - April 30, 1976.
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Soil Properties as Affected by Topography in Desert Wadis,
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CALIFORNIA STATE DEPT. OF WATER RESOURCES, SCRAMENTO.
Proceedings Tenth Biennial Conference on Ground Water, Total Water Management for California's Long-Range Needs.
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CALIFORNIA UNIV., BERKELEY. DEPT. OF CIVIL ENGINEERING.
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CENTRE D'ETUDES ET DE RECHERCHES DE BIOLOGIE ET D'OCEANOGRAPHIE MEDICALE, NICE (FRANCE).
The Problem of Mercury in the Mediterranean, (In French),
W76-11531 5B

CENTRE D'OCEANOGRAPHIE, MARSEILLE (FRANCE). STATION MARINE D'ENDOUME.
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The Effects of NTA on the Growth of Phytoplankton with Particular Consideration Given to Iron as a Microelement,
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Population Dynamics and Production of Daphnia Hyalina in a Eutrophic Reservoir,
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Ground-Water Flow and Pollution at a Well Field, Olean, New York,
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Estimated Costs of Mechanical Control of Water Hyacinths,
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Midsummer Metabolism of an Eelgrass Community,
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HAWAII UNIV., HONOLULU. WATER RESOURCES RESEARCH CENTER.
Collected Reprints, Volume III: 1971-1974,
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Mercury in Laundry Wastewaters,
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ILLINOIS UNIV., AT CHICAGO CIRCLE, CHICAGO. DEPT. OF INFORMATION ENGINEERING.
A Model for the Study of Episodes in the Dispersion of a Conservative Pollutant in Lake Michigan,
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ILLINOIS UNIV. AT CHICAGO CIRCLE. DEPT. OF GEOLOGICAL SCIENCES.
Towards a Computer-Based Information Monitoring System for Groundwater Data in New Zealand,
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IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND). APPLIED GEOCHEMISTRY RESEARCH GROUP.
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INGERSOLL-RAND CO., NASHUA, N.H.
Board Mill Wastewater Treatment System with Countercurrent Dissolved Air Flotation Thickening and Vacuum Filter Dewatering,
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INSTITUTE OF OCEANOGRAPHIC SCIENCES, WORMLEY (ENGLAND).
Lipid Composition of Surface Films, and Zooplankton from the Eastern Mediterranean,
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INSTITUTE OF PAPER CHEMISTRY, APPLETON, WIS.
Research on the Mechanisms for Removal of Soluble BOD(5) in Clarifier Systems,
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INSTITUTUL AGRONOMIC, BUCHAREST (RUMANIA).
Rapid Determination of NO3 in Water, (In Romanian),
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INSTITUTUL DE PROIECTARI PENTRU INDUSTRIA CHIMICA ANORGANICA SI INGRASAMINTELOR, BUCHAREST (RUMANIA). (ASSIGNEE).
Process for the Regeneration of Ion-Exchange Resins and Applications Thereof,
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INTERNATIONAL ASSOCIATION OF DRILLING CONTRACTORS, HOUSTON, TEX. ROTARY DRILLING COMMITTEE.
International Association of Drilling Contractors Drilling Manual,
W76-11102 8C

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT, WASHINGTON, D. C.
Village Water Supply, A World Bank Paper.
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IOWA STATE UNIV., AMES. DEPT. OF AGRICULTURAL ENGINEERING.
Effect of Tillage Systems on Runoff Losses of Pesticides: A Simulated Rainfall Study,
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Cost Optimization of Rural Water Systems,
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The Impact of Suburbanization on Stream Networks,
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Pollution in the Effluents of Bracciano Lake and in Arrone Stream, on the Basis of the Distribution of Simuliidae, Chironomidae, Culcidae and Other Diptera, (In Italian),
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Estimates of Industrial Waterborne Residuals Control Costs: A Review of Concepts, Methodology, and Empirical Results,
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Extended Aeration in a Combined Wastewater Treatment Plant,
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Vertical Distribution Patterns of Goldeye, Hiodon Alosoides, in Fort Peck Reservoir, Montana,
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KANSAS STATE BOARD OF HEALTH, TOPEKA. DIV. OF ENVIRONMENTAL HEALTH.
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Increase of Primary Production in a Bay of Malyi Zhemchuzhnyi Island (North Caspian) Using Inorganic Fertilizers, (In Russian),
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Legal Institutions for the Allocation of Water and Their Impact on Coal Conversion Operations in Kentucky,
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The Role of Environmental Data Banks in Energy Resource Development,
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Hygienic Evaluation of an Epoxy Compound and the Possibility of its Use in Submersible Electric Pumps for Domestic Purposes, (In Russian),
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Contemporary Chlorine Disinfection Practices in Ontario,
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Uptake Pathways and Elimination of a Nonionic Surfactant in Cod (Gadus Morrhua L.),
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LAB. TOXICOL., ALL-RUSS. RES. INST. PLANT PROT., RAMON, USSR. VSEROSSIISKII NAUCHNO-ISSLEDOVATELSKII INSTITUT ZASHCHITY RASTENII, RAMON (USSR). LAB. OF TOXICOLOGY.
Method of Determining Residues of the Herbicide Lenacil in Water, Soil and Sugar Beets, (In Rusian),
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LAMAR UNIV., BEAUMONT, TEX. DEPT. OF INDUSTRIAL ENGINEERING.
Effects of Water Quality on the Recreational Use of Water in South East Texas,
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Underground Storage of State Water Project Supply, A Progress Report,
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A New Concept in Small Water Systems,
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Continued Studies (Phase II) in the Search for A Predictive Model for Sludge Characterization Useful to Design and Control of Sludge Dewatering Processes in Water Recycle Systems,
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The Determination of Phenols in Water: Gas Chromatographic Identification by Means of the Electron Affinity, (In German),
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Modeling of Phytoplankton in Lake Ontario,
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Vertical Interactions in Phytoplankton Populations - An Asymptotic Eigenvalue Analysis,
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MARINE BIOLOGICAL ASSOCIATION OF THE UNITED KINGDOM, PLYMOUTH (ENGLAND). PLYMOUTH LAB.
Petroleum Compounds in the Marine Food Web: Short-Term Experiments on the Fate of Naphthalene in Calanus,
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Reduction of Field Populations of Fiddler Crabs by Uptake of Chlorinated Hydrocarbons,
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MARYLAND UNIV., COLLEGE PARK. DEPT. OF AGRICULTURAL ENGINEERING.
Feasibility of Chlorinating Feedlot Runoff to Meet Bacterial Water Quality Standards,
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Valuing Long-Run Ecological Consequences and Irreversibilities,
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Random Model of Evaporation of Oil at Sea,
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Land Treatment of Municipal Wastewater,
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Reclamation of Gas Turbine Waste Heat for Sludge Drying,
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METROPOLITAN TORONTO DEPT. OF WORKS, (ONTARIO). WATER AND POLLUTION CONTROL DIRECTORATE.
Metropolitan Toronto's Approach to Preventative Maintenance for Treatment Plants,
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METZ UNIV. (FRANCE).
Study of the Behaviour of Poliomyelitis Virus Type 1 in Different Hydrous Media, (In French),
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Herbicide Toxicity in Mangroves,
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An Experimental High-Ash Paper Mill Sludge Landfill,
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Storm Induced Relationships Among Chemical Conditions and Phytoplankton in Saginaw Bay and Western Lake Huron,
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Aerobic Thermophilic Treatment of High Strength Wastewaters,
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Phenoxy Herbicide Residues and Their Persistence,
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A Study of the Quality of Silk Reeling Water in Regard to Solubility of Cocoon-Sericin, (In Japanese),
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MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, BURNHAM-ON-CROUCH (ENGLAND). FISHERIES LAB.
Toxicity of Oil-Sinking Agents,
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MISSISSIPPI STATE UNIV., MISSISSIPPI STATE DEPT. OF CIVIL ENGINEERING.
Removal of Algae from Waste Stabilization Pond Effluent,
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An Evaluation of Public Hearings on Water Development Projects in Mississippi,
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Evaluation of Prior Appropriation in Mississippi,
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The Effects of Variations in Turbidity on Cycles of Planktonic and Benthic Organisms in Flood Control Reservoirs,
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MISSISSIPPI UNIV., UNIVERSITY. DEPT. OF ECONOMICS.
The Impact of Flooding Upon Land Values in the Big Black River Basin,
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MISSOURI UNIV., COLUMBIA. DEPT. OF AGRONOMY.
Fragipan Stability in Soil-Plant Effluent Disposal Systems,
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MOBIL OIL CORP., NEW YORK. (ASSIGNEE).
Flocculation Process,
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MONTANA STATE UNIV., BOZEMAN. DEPT. OF CIVIL ENGINEERING AND ENGINEERING MECHANICS.
Land Treatment and Disposal of Municipal and Industrial Wastewater,
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MONTCLAIR STATE COLL., UPPER MONCLAIR, N. J. DEPT. OF BIOLOGY.
Antimicrobial-Resistant Coliforms in New York Bight,
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MONTECO ENVIRONMENTAL MANAGEMENT ASSOCIATES, MONTGOMERY, N.Y.
Inhibition of Nitrification by Ammonia and Nitrous Acid,
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MORSKI INSTYTUT RYBACKI, GDYNIA (POLAND).
The Baltic Sea Pollution,
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MOSCOW STATE UNIV. (USSR). DEPT. OF HYDROBIOLOGY.
Relation Between Generation Time and Biomass of Phytoplankton, (In Russian),
W76-11577 5C

MOSCOW STATE UNIV. (USSR). DEPT. OF INVERTEBRATE ZOOLOGY.
Invertebrate Fauna of the Lakes of the Lower Tareya River (Western Taimyr), (In Russian),
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MOSCOW STATE UNIV. (USSR). DEPT. OF SOIL SCIENCE.
Characteristics of the Quality of Irrigation Water on the Bagaevsk-Sadkovsk Irrigation System, (In Russian),
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MUNICIPAL ENVIRONMENTAL RESEARCH LABORATORY. CINCINNATI, OHIO.
Comparative Effects of Chemical Pretreatment on Carbon Adsorption,
W76-11209 5D

MUSEUM NATIONAL D'HISTOIRE NATURELLE, PARIS (FRANCE). LABORATOIRE DE PHYSIOLOGIE GENERALE ET COMPAREE.
Ecotoxicology of Crude Oils and the Use of Experimental Marine Ecosystems,
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NALCO CHEMICAL CO., OAK BROOK, ILL. (ASSIGNEE).
Cationic Polymers for Breaking Oil-In-Water Emulsions,
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Review of Standards and Other Information on Thermoplastic Piping in Residential Plumbing,
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NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C., BUILDING ECONOMICS SECTION.
Cost Sharing to Induce Efficient Techniques of Abating Wastewater Pollution,
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NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. INST. FOR MATERIALS RESEARCH.
Fluorescence Measurements of Carcinogenic and Polycyclic Aromatic Hydrocarbons in Water,
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ANN ARBOR, MICH. GREAT LAKES ENVIRONMENTAL RESEARCH LAB.
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO. OUTER CONTINENTAL SHELF ENVIRONMENTAL ASSESSMENT PROGRAM.
The Alaskan Outer Continental Shelf Environmental Assessment Program,
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D. C.
Objective Analysis of IFYGL Surface Meteorological Data,
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D. C. CENTER FOR EXPERIMENT DESIGN AND DATA ANALYSIS; AND NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D. C. ENVIRONMENTAL DATA SERVICE.
A Study of Lake-Land Breeze Circulation over Lake Ontario from IFYGL Buoy Observations,
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D. C. ENVIRONMENTAL DATA SERVICE.
The Atmospheric Budgets Program of IFYGL,
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NATIONAL OCEANOGRAPHIC INSTRUMENTATION CENTER, WASHINGTON, D.C.
The Meaning and Measurement of Turbidity,
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NATIONAL VEGETABLE RESEARCH STATION, WELLESBOURNE (ENGLAND).
Simulation of the Water Balance of Soil Columns and Fallow Soils,
W76-11510 2D

NATIONAL WATER AUTHORITY, BUDAPEST, HUNGARY. DEPT. OF WATER MANAGEMENT POLICY.
Multi-Criterion Ranking of Alternative Long-Range Water Resource Systems,
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NATIONAL WATER QUALITY LAB., DULUTH, MINN.
X-Ray Diffraction and Electron Beam Analysis of Asbestiform Minerals in Lake Superior Waters,
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NATIONAL WEATHER SERVICE, SILVER SPRING, MD. TECHNIQUES DEVELOPMENT LAB.
Great Lakes Wind Forecasts Based on Model Output Statistics,
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NATURHISTORISKA RIKSMUSEET, STOCKHOLM (SWEDEN).
Mercury Level as a Function of Size and Age in Northern Pike, One and Five Years After the Mercury Ban in Sweden,
W76-11401 5C

NAUCHNO-ISSLEDOVATELSKII INSTITUT EPIDEMIOLOGII, MIKROBIOLOGII I GIGIENY, VILNIUS (USSR).
Hygienic Evaluation of Polychloropinene and Alkylbenzene Sulfonate Present Together in Surface Waters, (In Russian),
W76-11530 5C

NAUCHNO-ISSLEDOVATELSKII INSTITUT GIGIENY, MOSCOW (USSR).
Hygenic Evaluation of Ionic Composition of an Imitation of Desalinated Sea Water, (In Russian)
W76-11529 5C

NAUCHNO-ISSLEDOVATELSKII INSTITUT SELSKOI GIGIENY, SARATOV (GIGIENY).
Study of the Effect of Water Desalinated by Electrodialysis on Some Biological Objects, (In Russian),
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NEBRASKA UNIV., LINCOLN. DEPT. OF AGRICULTURAL ENGINEERING.
Energy Reduction Through Improved Irrigation Practices,
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NEWCASTLE-UPON-TYNE UNIV. (ENGLAND). DEPT. OF PLANT BIOLOGY.
Fluoride in Marine Animals,
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NIIGATA PREFECTURE (JAPAN). FOR. DIV.
Mass Destruction of Synthliboramphus Antiquus by Oil Pollution of Japan Sea,
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NORTH CAROLINA DEPT. OF NATURAL AND ECONOMIC RESOURCES. DIV. OF ENVIRONMENTAL MANAGEMENT.
Shallow Subsurface Disposal of Wastewater,
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First the Water, Then the Sewer, Then Land Use Planning: Coastal Planning in Retrospect and in the Now,
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Man Discovers the Coastal Environment: A Footprint in the Sand,
W76-11621 5D

NORTH CAROLINA STATE UNIV., RALEIGH.
Effects of Sulfur Dioxide and/or Ozone on Several Oat Varieties, 1975 Annual Report,
W76-11190 5C

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF BIOLOGICAL AND AGRICULTURAL ENGINEERING.
Land Disposal of Wastewater,
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NORTH CAROLINA STATE UNIV., RALEIGH. SEA GRANT PROGRAM.
Impact of Water Supply and Wastewater on the Coastal and Marine Environments,
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NORTH CAROLINA UNIV. AT CHAPEL HILL. DEPT. OF ENVIRONMENTAL SCIENCES AND ENGINEERING.
Wastewater Reuse in Coastal Areas,
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NORTH CAROLINA UNIV. AT CHAPEL HILL. INST. OF GOVERNMENT.
Management and Financing Alternatives for Waste Disposal in Coastal Areas,
W76-11616 5E

NORTH CAROLINA UNIV. AT CHAPEL HILL. WASTEWATER RESEARCH CENTER.
The Role of Conventional Wastewater Treatment in Coastal Areas,
W76-11229 5D

NORTH CAROLINA WATER RESOURCES RESEARCH INST., RALEIGH.
Proceedings of the Southeastern Conference on Water Supply and Wastewater in Coastal Areas,
W76-11224 5D

NORTHWESTERN UNIV., EVANSTON, ILL.
Fly Ash - A Potential Asset in Wastewater Treatment,
W76-11274 5D

NOYES DATA CORPORATION, PARK RIDGE, N.J.
How to Dispose of Toxic Substances and Industrial Wastes,
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OESEN (HENRY VON) AND ASSOCIATES, INC., WILMINGTON, N. C.
Water Supply and Wastewater Disposal - Planning and Problems - In Coastal Areas,
W76-11225 5D

OFFICE DE LA RECHERCHE SCIENTIFIQUE ET TECHNIQUE OUTRE-MER, ABIDJAN (IVORY COAST). CENTRE DE RECHERCHES OCEANOGRAPHIQUES.
Effect of the Degree of Vacuum Used in Filtration on the Simultaneous Measurement of Assimilation and Excretion by Phytoplankton Organisms, (In French),
W76-11554 5C

Primary Production in the Mauritanian Upwelling in March 1973, (In French),
W76-11555 5C

OFFICE DE LA RECHERCHE SCIENTIFIQUE ET TECHNIQUE OUTRE-MER, NOUMEA (NEW CALEDONIA). CENTRE ORSTOM DE NOUMEA.
The Principal Aspects of Desalination of Surface Waters of the Tropical Southwestern Pacific, (In French),
W76-11539 2D

OFFICE OF WATER RESEARCH AN TECHNOLOGY, WASHINGTON, D. C.
The Availability of Desalting for Water Supply from Saline Sources,
W76-11619 3A

OHIO STATE UNIV., PUT-IN-BAY. CENTER FOR LAKE ERIE AREA RESEARCH.
Laboratory Estimates of the Seasonal Final Temperature Preferenda of Some Lake Erie Fish,
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OHIO WESLEYAN UNIV., DELAWARE. DEPT. OF BOTANY AND BACTERIOLOGY.
A Comparison of the Abundance and Diversity of Fossil Pigments in Wetland Peats and Woodland Humus Layers,
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OKLAHOMA STATE UNIV., STILLWATER. SCHOOL OF CIVIL ENGINEERING.
One- Versus Two-State Nitrification in the Activated Sludge Process,
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ONTARIO MINISTRY OF THE ENVIRONMENT, REXDALE. LAB. SERVICES BRANCH.
Source Identification of Fuel Oil Spills,
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ONTARIO MINISTRY OF THE ENVIRONMENT, TORONTO. WATER RESOURCES BRANCH.
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ORANGE COUNTY WATER DISTRICT, FOUNTAIN VALLEY, CALIF. BOARD OF DIRECTORS.
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Temperature, Infectious Diseases, and the Immune Response in Salmonid Fish,
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OTTAWA UNIV. (ONTARIO). DEPT. OF BIOLOGY.
Changes in Phytoplankton Following Nitrate Phosphate Additions to Large Enclosures in Marion Lake, British Columbia,
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PAPIRIPARI VALLALAT KUTATO- ES FEJLESZTOINTEZETE, BUDAPEST (HUNGARY).
Determination of Aluminum under Papermaking Conditions,
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PARMA UNIV. (ITALY). INSTITUTO DI ZOOLOGIA.
Radioactivity in the Mediterranean Sea, (In Italian),
W76-11558 5A

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. SCHOOL OF FOREST RESOURCES.
Experiences at Penn State with Land Application,
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PETERBOROUGH UTILITIES COMMISSION, PETERBOROUGH, ONTARIO, CANADA, FILTRATION PLANT.
Automated Fluoridation Using a Selective Ion Electrode,
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POLITEKHNICHESKII INSTITUT, LENINGRAD (USSR).C
Study of Water Sorption on Biopolymers, (In Russian).
W76-11532 2K

PRINCE EDWARD ISLAND, CHARLOTTETOWN. DEPT. OF SOCIOLOGY AND ANTHROPOLOGY.
Local Attitudes and Water Resources Development: A Canadian Case Study,
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PURDUE UNIV., LAFAYETTE, IND. DEPT. OF SOCIOLOGY AND ANTHROPOLOGY.
Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities: Population Characteristics and Residential Water Use,
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PURDUE UNIV., LAFAYETTE, IND. SCHOOL OF CIVIL ENGINEERING.
Interactions Between Land Use and Urban Water Resources Planning,
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PURDUE UNIVERSITY, WEST LAFAYETTE, INDIANA, WATER RESOURCES RESEARCH CENTER.
Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities. Phase I. Final Report,
W76-11175 6B

Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities: Regional Aquifer Evaluation Studies with Stochastic Inputs,
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Cost-Benefit Analysis, Property Right Specification and 'Distribution',
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RESEARCH TRIANGLE INST., RESEARCH TRIANGLE PARK, N. C.
Bureau of Land Management's Environmental Studies Program for the South Atlantic Outer Continental Shelf Area. Conference/Workshop Proceedings,
W76-11474 6G

RESOURCES FOR THE FUTURE, WASHINGTON, D.C.
Costs of Water Quality Improvement, Transfer Functions, and Public Policy,
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Voting, Cost-Benefit Analysis, and Water Pollution Policy,
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